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International Considerations Associated with Economic Planning Recovery from a Generalized Disas

Donald W Jones
Lawrence J. Hill

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This report addresses international economic considerations in planning for recovery from a generalized disaster, including the geographical dispersion of economic activity and the importance of the U.S. dollar in international trade. The discussion includes real trade issues and international monetary or financial considerations, emphasizing the relationship between the two. Included in the discussion of international monetary considerations are the causes, consequences, and resolution of six historical financial crises which are used as analogues for planning for restoration of the international

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monetary system. Additionally, the foundation of the multinational enterprise and its possible roles in recovery are addressed.

Although the report addresses several specific disaster scenarios and appropriate policy responses in reaction to them, a number of important general policy guidelines were discussed. First, international cooperation and coordination are of paramount importance in restoring the effective functioning of the international monetary system. Second, a policy of fixed exchange rates in the aftermath of an international disaster is ill-advised. Third, except for commodities crucial to national defense, domestic import and export controls cannot be justified. Fourth, the extent of real trade reduction during a conflict has widespread financial--as well as real--repercussions. The United States probably could withstand real trade disruptions during a conflict more successfully than many of its current trading partners. Finally, multinational enterprises might be important institutions in recovery from both real and monetary standpoints, acting as the international conduit for capital flows, trade flows, and, in more serious disasters, price signals and international monetary and financial reconstruction.

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INTERNATIONAL CONSIDERATIONS ASSOCIATED WITH ECONOMIC PLANNING FOR RECOVERY FROM A GENERALIZED DISASTER

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ABSTRACT

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ASSOCIATED WITH ECONOMIC PLANNING FOR RECOVERY
FROM A GENERALIZED DISASTER

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This report addresses international economic considerations in planning for recovery from a generalized disaster, including the geographical dispersion of economic activity and the importance of the U.S. dollar in international trade. The discussion includes real trade issues and international monetary or financial considerations, emphasizing the relationship between the two. Included in the discussion of international monetary considerations are the causes, consequences, and resolution of six historical financial crises which are used as analogues for planning for restoration of the international monetary system. Additionally, the foundation of the multinational enterprise and its possible roles in recovery are addressed.

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1. INTRODUCTION

The purpose of this report is to discuss international economic considerations in the aftermath of a geographically widespread, generalized disaster, as would result from a nuclear conflict. The report addresses both potential problems in the international economy that could impinge on domestic U.S. recovery and opportunities for enhancing U.S. recovery by appropriately applied policies toward the international economy. This chapter lays the foundation for the remainder of the report. It is comprised of two sections. In the first section, international issues associated with a generalized disaster will be explored. Those issues serve as the basis for organizing the remainder of the report. The second section addresses a fundamental premise in this study: economic activity will continue after a catastrophic disaster and markets--both domestic and international--will be the foundation of that activity. To illustrate this, three prior disasters will be briefly discussed: (1) the Athenian Plague of the Peloponnesian War, (2) the bubonic plague in Europe from 1347-1381, and (3) the Hundred Years' War from 1337-1453.

1.1. INTERNATIONAL ISSUES IN RECOVERY

Problems associated with economic recovery from a generalized disaster resulting from a hypothetical nuclear conflict have occupied the attention of government planners and researchers since the outset of the nuclear age following World War II. Studies of a postdisaster economy have addressed both the physical infrastructure (surviving tangible human and physical resources) and the institutional infrastructure (the environment that coordinates and facilitates economic exchange).[1] However, the problems associated with economic recovery, have been conceived largely in terms of the domestic U.S. economy. That is, the typical approach in addressing the recovery problem has been to impose a hypothetical nuclear disaster scenario on the U.S. economy and to speculate on the ability of the economy to recover, using surviving domestic resources.[2] Moreover, studies related to the institutional

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[1]Although both components of a damaged economy have been addressed in the literature, emphasis has been placed on the physical infrastructure. That is, economic recovery has been viewed largely in terms of surviving physical resources in the majority of studies. For a discussion and assessment of prior research on economic recovery from a generalized disaster, see Hill (1987).

[2]Two approaches have been used to make these assessments in the literature: (1) economic resource assessments and (2) simulation of economic models. National or subnational resource assessments have ranged from simple analyses of surviving population, labor, and industrial capacity to relatively detailed analyses of the surviving

infrastructure have generally focused on domestic policy tools: economic organization, fiscal tools, and monetary policy. The problems and opportunities associated with the international economy--and how they impinge on domestic U.S. recovery--have been ignored for the most part.

There are two plausible reasons for this emphasis on surviving domestic resources. First, analyzing a damaged "closed" economy (such as the United States with no foreign interaction) is much more analytically tractable than including intercountry relationships in assessing the recovery potential of the economy. Second, much of the research on recovery was conducted during a period of time in which the United States had the dominant industrial economy in the world, obtaining much of its heavy industry requirements from domestic sources. Hence, analyzing the U.S. economy in an international vacuum could be justified more then than today because today's international industrial production is much more geographically dispersed.

This report discusses international considerations in planning for recovery from a generalized disaster, considering the geographical dispersion of economic activity and the importance of the U.S. dollar in international trade. Similar to the classification of economic activity into physical and institutional infrastructures used in earlier studies, the report addresses both surviving international physical resources ("real" issues) and the international financial or monetary system which coordinates and facilitates international trade ("monetary" issues). Although the topics addressed in the report are the most important considerations in economic planning, the discussion of those topics is presented at a level conducive to reaching the widest possible audience.

The remainder of the report is organized into seven chapters. The next chapter provides a background on real and monetary aspects of the U.S. economy's relationship to the international economy. The first part of the chapter addresses the changing composition of U.S. trade over the past decade on both a geographical and product basis. Increasing reliance of the U.S. economy on foreign imports has two important implications. First, many critical or essential manufacturing inputs which in prior years were produced in large measure by the United States are now being produced in other parts of the world.[3] Although predisaster international trade relationships cannot be used to speculate on the ability of the U.S. economy to recover from a large-scale disaster, there are many important inputs used in the economy which are increasingly derived from foreign producers. An example is electronic

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labor-capital composition.. Economic models have been constructed and simulated using surviving labor and capital as inputs.

[3]Other than personal items required for survival (food, shelter, and clothing, as examples), it is very difficult to rank manufacturing inputs on the basis of their criticality for economic recovery. The problems associated with this undertaking are addressed in Leavitt (1974) and Sachs and Leavitt (1974).

components used for automated control systems in manufacturing plants. Second, because the U.S. economy is the largest and increasingly provides important markets for foreign producers in both the industrialized and developing world, any contraction of U.S. output attributable to disaster-related damage will have repercussions in the output of foreign economies. Important markets for foreign producers in the U.S. economy will contract or disappear.

The second section of Chapter 2 addresses monetary or financial aspects of the international economy. To illuminate various characteristics of the financial side of international trade, the evolution of the international monetary system since the Bretton Woods conference in 1944 is discussed. Key features of the system in the post-war years are (1) the creation of the gold exchange (or dollar) standard at Bretton Woods in which the U.S. government guaranteed to exchange dollars for gold at a prespecified rate; (2) the subsequent abandonment of the dollar standard in 1971 (as part of President Nixon's New Economic Policy) because of the decline in the U.S. gold stock and increase in international dollar liabilities; and (3) the rise of the eurodollar market.[4] Three key features of the international financial system will be emphasized in the discussion: (1) the management of the system; (2) the mechanism used to resolve international payments imbalances; and (3) the assets (gold, special drawing rights, and national currencies) used to settle payments imbalances. More recently, the accumulation of "petrodollars" by oil-exporting countries as a result of the precipitous increase in world oil prices during the 1970s and the subsequent recycling of those dollars into the banks of industrialized countries have been sources of problems for the international financial system.[5] Additionally, due in large measure to sizeable U.S. balance of trade deficits, there has been a recent proliferation of capital inflows into the United States in the form of both direct and portfolio investment.

Chapters 3 through 6 expand on the overview of real and monetary issues discussed in Chapter 2. In Chapter 3, various aspects of real trade flows in the aftermath of a disaster are addressed. Specifically, the question addressed is the changes in foreign trade that the United States is likely to experience and the trade policies that could enhance the prospects for economic recovery. The discussion addresses an alteration in international comparative advantage attributable to changes in relative factor abundances, changed relative technological structures, and changes in domestic industrial structures under various attack and destruction scenarios. One of the most important scenarios deals with

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[4]A eurodollar is a U.S. dollar deposited in a bank outside of the United States. The deposit is a liability of the foreign bank, but denominated in the U.S. dollar.

[5]The term "petrodollars" refers to the revenue derived from the sale of petroleum by oil-exporting countries in the aftermath of the two oil price shocks of the 1970s. It is so-named because the majority of international oil transactions transpire using the U.S. dollar.

biological and climatological effects of the disaster (nuclear winter) and its effect on the ability of nations to maintain their surviving populations.

Chapters 4 and 5 address short-run and long-run monetary aspects of the international economy, respectively. To better understand potential problems with the international financial system in the aftermath of a nuclear conflict, Chapter 4 discusses six historical financial panics, their causes, their consequences, and their subsequent resolution. The panics include the Gold Standard Crisis of 1847, the Overend-Gurney Crash of 1866, the Baring Crisis of 1890, the international financial crisis preceding World War I, the 1931 collapse of the international economy, and more recently, the developing country debt crisis of 1982. Each of these crises and their resolution have important implications for international financial planning. The lessons learned from the crises are discussed at the end of the chapter.

Chapter 5 addresses long-run monetary considerations. One of the most important considerations is the use of a domestic national currency as a major currency in international transactions. Because of the relative size of the U.S. economy in international economic activity and its relatively stable political system, the U.S. dollar presently serves as an international currency. That is, the majority of international transactions are denominated in U.S. dollars, and the dollar serves as the major reserve currency, accounting for more than two-thirds of the currency reserves in the international financial system. One of the important considerations discussed in the chapter is the impact of a large-scale disaster on the U.S. dollar's role as a primary reserve currency. Another consideration addressed in the chapter is the linkage between international economic activity and domestic macroeconomic performance. This issue is important because a national government should be concerned about employment levels, savings and investment, and a stable price level as the recovery process proceeds. Here, the linkages between international activity and domestic capital markets and monetary and fiscal stabilization measures will be discussed.

In terms of planning for economic recovery, another important consideration from both real and monetary standpoints is the recent proliferation of U.S. multinational enterprises (MNEs). MNEs are the topic of discussion in Chapter 6. MNEs have obvious importance for recovery because they produce for the U.S. market in foreign countries. Indeed, one of the most recent phenomena associated with MNEs is the increasing use of "out-sourcing;" that is, primarily because of labor costs and environmental regulations, there is an increasing tendency on the part of U.S. MNEs to produce intermediate products overseas and then export them back for use in the domestic economy. The aspects of MNEs discussed in Chapter 6 include reasons for multinationalization, the role of the MNE in securing raw materials, and the diversification effects of multinationalization. In terms of economic recovery, MNEs role in providing both price signals and access to additional capital will be explored.

The discussion of the real and monetary aspects of the international economy in Chapters 2 through 6--and the relationship of the domestic U.S. economy to the international--serves as the basis for discussion of economic planning in Chapter 7. The intent is to present the relevant issues and potential problems in those five preceding chapters and to draw on them for the discussion of possible approaches to resolving international trade and monetary problems in Chapter 7.

The discussion of planning for problems with the international financial system and international trade in the aftermath of a nuclear disaster in Chapter 7 is provided in the context of a number of dimensions of a hypothetical nuclear conflict. The dimensions of a hypothetical nuclear disaster must be defined because planning must necessarily be flexible enough to accommodate a range of scenarios. Four dimensions are especially important: (1) the type of disaster, (2) biological and climatological effects, (3) population maintenance, and (4) political considerations. Each will be discussed in turn.

First, the nature and extent of the conflict must be considered. For an attack on the United States, there are a number of possibilities. The attack could be directed primarily at military targets; that is, a counterforce attack. Under this scenario, destroying population and economic resources is secondary to eliminating military capability. Alternatively, a countervalue attack--directed at population and manufacturing sectors--could be launched for the purpose of destroying U.S. economic capability. One possible countervalue attack is to target critical sectors of the economy to create production bottlenecks. An example of a critical sector is petroleum production, refining, and transport. The key issue under these scenarios for economic planning is the level of destruction of economic resources.

Another facet of this dimension is the geographical extent of the conflict. An attack directed solely at the United States has different implications for planning than an attack directed at, for example, all of the NATO countries and Japan. An important consideration for international trade under this scenario is surviving transport and communication links between the U.S. economy and potential trading nations. The implications for international planning are further complicated if the conflict is preceded by a period of international tension resulting from, for example, a confrontation between conventional forces in Europe. Under this scenario, the international financial system will in all likelihood be thrown into chaos before the actual nuclear exchange.

The second dimension to be considered is the biological and climatological effects of the disaster. Often referred to as "nuclear winter," the consequences of this phenomenon for recovery are wide-ranging. One of the most important aspects is the time in which the disaster occurs. If the attack occurs during an agricultural growing season, the indirect biological and climatological effects of the attack on areas which are not directly affected will in all likelihood lead to the loss of the entire crop for the year. Additionally, the indirect

effects of the attack will pose significant problems in many countries not directly involved in the conflict. These countries may also lose a growing season. For countries which do not have ample stockpiles of food, the indirect effects of the attack may be disastrous unless trade can be restored. In terms of disaster planning, the restoration of trade will be important if the countries experiencing the indirect effects of the exchange are sources of important non-agricultural commodities used in manufacturing.

Not unrelated to the second dimension, the third dimension of a nuclear disaster relates to the ability of the United States, its allies, and potential trading partners to maintain or preserve their surviving populations. Key facets are assuring a sufficient amount of food, water, shelter, and clothing for survival in the immediate postdisaster period. The aforementioned discussion of biological and climatological effects on food, water, and the surviving population is applicable to this dimension. Another consideration is the existence and effectiveness of civil defense programs in the United States and other potential combatants.

Finally, there is the political dimension. Above all, this dimension involves winners and sovereignty. Planning for recovery from a nuclear disaster must necessarily assume that U.S. sovereignty is maintained.[6] This includes not only the survival of a legitimate recognized government, but also a military capability to defend the population and surviving resources. Additionally, in the context of international trade, an important consideration is the established political relationships between the United States, its allies, and potential trading partners, especially those that are potential sources of primary and intermediate goods which would be used to eliminate bottlenecks in the domestic economy.

These four dimensions of a nuclear disaster form the foundation for the discussion in Chapter 7. In the chapter, the problems and opportunities for international trade in the aftermath of a nuclear disaster--under the four dimensions--are discussed. The discussion includes both real aspects of the problem--surviving physical resources--and monetary aspects--the international financial system used to coordinate and facilitate the international flow of surviving physical resources. The conclusions drawn from this discussion are presented in Chapter 8.

1.2. PRIOR CATASTROPHIC DISASTERS AND ECONOMIC ACTIVITY

The underlying premise on which this study is based is that, given surviving resources in the aftermath of a large-scale nuclear disaster and political sovereignty of nations, economic activity will continue and

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[6]A continuity of government program exists within the planning apparatus of the Federal Emergency Management Agency.

expand. In many quarters, objections to the analysis of economic interactions in a postattack world have been raised because of the alleged reduction of attacked societies to a primitive level. In short, it has been argued that the entire subject is fatuous.

A general argument in the presence of such a cataclysmic event takes the following form. Personal and social motivations as mankind has known them throughout history would cease to exist. Shock at the loss of loved ones and the destruction of physical artifacts of civilization would so disorient people that societies would have to re-evolve in order for people to have the sort of meaningful, mutually consensual interactions upon which an economy is built. The surviving population would become a wandering species. If, rather than occurring spectacularly and cataclysmically, nuclear war instead were waged on some desultory sort of basis for a period of years--a city erased here, one retaliated for there--the fabric of society gradually would lose its coherence. Laws would fall into disuse as enforcement became tenuous, lands would be left untended, a new feudalism would arise in which the strong would take what they could and the weak would suffer what they must. National integration would crumble as movement became unsafe from marauders. The remnants of national armies would move across the landscape, pillaging and trying to avoid nuclear strikes Alternative scenarios are available, but the implication with which the remainder of this study must contend is that personal motivations for the surviving population to engage in economic activities would be severely weakened or would disappear.

Proof that this scenario is improbable cannot be given, but we can report on the behavior of various societies in the aftermath of localized and generalized disasters of catastrophic proportion. Invariably, we find little interruption in the economic activity of remaining populations and evidence supporting the contention that economic exchanges and markets remain robust and vibrant in the most severe and most long-drawn-cut circumstances. In the remainder of this section, three disasters of varying duration and extent are discussed: (1) the Athenian plague of 430 BC in the second year of the Peloponnesian War; (2) the bubonic plagues of Europe in the fourteenth century; and (3) the Hundred Years' War, which began before and ended after recurrent bouts with the Black Death in the fourteenth century. Emphasis is placed on social disruption and its effect on markets and economic activity in general.

1.2.1. The Athenian Plague of the Peloponnesian War

Thucydides reported the outbreak of the plague in Athens in the summer of 430, during a period of time in which the Spartans and their allies invaded Attica and went about destroying the crops (Thucydides, II.47-54). He noted the breakdown of some social conventions regarding burial, and a disregard for law as fear of apprehension and punishment was displaced by a high anticipation of death from disease before court machinery could complete its cycle. Thucydides reported that ". . . the rich died in a moment, and those who had nothing immediately inherited

their property . . ." (2.53). It is impossible from the translated text to determine if this is an instance of lawlessness or an operation of law, or some mix of the two. Nonetheless, the well and yet-to-fall-ill cared for the sick and dying. Violations of convention did not sink beyond that point. Finally, upon return from his successful naval raiding expedition against the Peloponnesian coastal towns, Pericles was brought to task publicly for getting the city into the war in the first place. He subsequently was fined. This was not the pinnacle of the breakdown of public order, however, a consuming of the public officials, but rather the standard fare of Athenian politics. He was elected general and given charge of the city soon thereafter.

Nonetheless, refugees from the countryside poured into Athens for protection against the invading army; they apparently died in roughly the same proportion as the permanent inhabitants. Amidst the ravages of the plague, the Athenians outfitted and dispatched two military expeditions: the one under Pericles was successful; the other was interrupted by incursion of the plague, but it returned to Athens with its complete armament despite the loss of 25 percent of the force to plague in just forty days.

Having noted the breakdown of burial conventions and some lawlessness, what is particularly notable for the present purpose is that the population at risk in Athens kept growing during the summer, and that despite the deaths, the survivors ate. Thucydides reported no evidence of famine, and, in fact, contrasts the plague from famine. And this while the Spartan army and its allies were burning the crops in the hinterland of Athens. An answer to the question of how the food got there may be military levies on Athens' allies or neutral cities, although no mention was made of Athens' depredations against neutrals and its allies and subjects this early in the war. Athens did have a sizeable store of silver in the acropolis with which purchases could be made, and the questionable reference above to "inheritances" suggests that possessions and money continued to be effective resource allocation devices for the survivors, even if titles were questionable.

The death toll was severe, its cause was unknown, and the disease was untreatable by contemporary medicine; yet the city's population continued to feed itself, to enjoy the fruits of money and possession, and to send out successful military expeditions. It even attracted refugees from the countryside where, presumably, food was more scarce. Clearly the society continued to function much as it did in healthier times, if possibly with a bit of a hedonistic attitude.

An objection may be raised that the disastrous plague was highly localized and the society had some knowledge of such plagues, recognizing that its very existence probably was not in question even if many individual lives were. Therefore the example is an inadequate precedent from which to suggest that economic functions might continue in the aftermath of a nuclear attack. Possibly, but in the building of a case, it is an instance of apparently sturdy social resiliency in the face of disaster.

1.2.2. The Bubonic Plague in Europe, 1347-1381

The first bout of the Black Death swept up from the Mediterranean beginning in late 1347, and spread out in waves over Spain, France, England, western Germany, Denmark, Sweden, Norway, and Bohemia through 1350 (Abel, 1978, pp 42-44). Assessments of the population loss place the death toll from one-third to one-half of the total population of the affected areas. Losses by districts varied from one-eighth to two-thirds. Cities apparently were harder hit than the countrysides, but evidence indicates that the latter areas were affected. Wages promptly rose, and despite widespread reports of inadequate manpower to till the soil, they rose relative to food prices which themselves rose because money was not destroyed. France and Britain both imposed wage controls to keep food prices down, but the restrictions were ineffective (Miskimin, 1963, p. 23). The prices of manufactured goods rose even more than food prices and wages, most likely because of the greater decimation of urban manufacturing work forces (Abel, 1978, p. 46).

The plague returned in 1356 in Germany and Bohemia, and again in 1362 in Germany and Italy. In 1369, it spread throughout Europe again, although in England it claimed only some thirteen percent of the population. In 1379-81, it returned again in particular force: over 15,000 died in Vienna alone, and in some Czech territories, scarcely one person in ten survived the plague of 1379. The virulence of attacks began to dissipate in the fifteenth century, and attacks were more localized. For nearly forty-five years, it was a recurrent devastation that depopulated Europe to such an extent that many rural areas did not recover their early fourteenth century populations until well into the nineteenth century. Villages were deserted for centuries, and sizeable migrations occurred in the refilling process.

Overall, however, the population reproduced itself very quickly, with birth rates reaching as high as 40 per 1000. Those surviving showed the same joie de vivre that the surviving and awaiting Athenians did in the summer of 429 BC, but for a much longer time: "Many contemporary writers described how the throng of newly-rich spent their overnight fortunes on riotous living" (Abel, 1978, p. 46). Real wages continued to climb over the next century, despite the continuing outbreaks of plague. Governments continued to collect taxes and wage wars, and interregional and international trade continued, despite some occasional quarantines of grain ships to keep rats out (Jones, 1977, p. 146).

Again, an objection may be raised that these European societies faced only partial depopulation, not universal property destruction and the prospect of extinction. For every district losing two-thirds of its population, there were others which lost far less, and in the larger societies, the social bonds held. Yes, but one third to one half of a national population is a large fraction to lose in a one- to two-year period. And some claims are made that it was the old, the sick, and the weak who succumbed, and that Europe was left with a younger, healthier, and wealthier population as a result, a veritable Marshall Plan (Jones, 1981, p. 56). Again true, but the distress of family destruction and

stresses of anticipation must have been great; yet societies continued to function. Instead of anomie, we hear of riotous living. Again, another element in a case for the resiliency of societies in the face of long-term subjection to random largely unforestallable death.

1.2.3. The Hundred Years' War, 1337-1453

The period of intermittent warfare between England and France in the fourteenth century overlapped the period of the Black Death later in that century, and must have added to societal stress induced by the disease. It undoubtedly helped to spread it. European war at that time did not directly kill enough people to make a real dent in the population of a region (Hohenberg and Lees, 1985, p. 81). The armies themselves contained less than one percent of the combined populations of England and France (Miskimin, 1963, p. 3). However, the armies by and large lived off the land, looting and destroying property, including crops and agricultural equipment, and far more importantly, interfering with agricultural tasks, so the potential for disruption was severe. In fact, reports indicate that in some locales farm populations hid in the forests when the soldiers came through and came back out and repaired the damage fairly quickly after their departure (Duby, 1968, pp 296-28). Overall, though, half of the agricultural land in France north of the Loire had returned to waste by the middle of the fourteenth century, and even thirty years after the war, in 1484, depopulation was reported from the area (Abel, 1978, pp 68-69). Abel also finds grain prices in western and central Europe diverging after 1350, not to converge again until the middle of the sixteenth century and attributes this at least partially to political events surrounding the war (Figure 9, p. 50).

Clearly, foreign trade was interrupted, but markets in the areas directly affected by the armies continued to register scarcities by rising prices and depressed demands by falling prices. In fact, Postan indicates that as much agricultural destruction through a "decline of investment in agricultural improvements in dikes, drainage, and deforestation" (Postan, 1942, p. 5). Despite Postan's suggestion that war finance redistributed wealth more than it destroyed it, his later work suggests that disturbances emanating from England's financing methods may have been as disruptive to markets as the actual armies and hostilities were to the areas marched over in France (Postan, 1964; 1942, p. 5).

The direct effects of the Hundred Years' War are mixed with the depopulations of the plagues and are difficult to separate. Both the lack of use of the French agricultural land and the decline in infrastructural investment are consistent with the overall depopulation from disease as well as with devastation by intermittent warfare and garrisoned armies. However, the events following the attacks of plague described in the previous section contain the effects of warfare in France, yet wages and grain prices in France behaved much as they did at Frankfurt am Main between 1350 and 1525 (Abel, 1978, Figure 10, p. 52). We conclude that the <u>combination</u> of warfare and plague over three or four generations did not disorient the affected societies sufficiently to be

unresponsive to market scarcities, as indicated by price and wage movements and by secondary reports on high living.

Again, we can question the relevance of the case. The war generally did not kill civilian populations, and the agricultural capital stocks destroyed were easily replaceable as a rule, being made predominantly of wood and a little simple iron. Most of France was unaffected, and England only sent a few soldiers and interfered with a few markets through taxation. But the raising of armies came from all of France, and a good portion of it was subject to occupation and mobile depredation for approximately one hundred fifteen years. Some of the best agricultural land of France was taken out of production over this time. In combination with the plague, it should have been a good test of the solidity of French society. In fact, this period saw the development of the nation state in France, just the opposite of social and political disintegration.

1.2.4. Catastrophe, Societal Cohesion, and the Market

By themselves, none of the three cases we have discussed may be persuasive of the proposition that drastic and possibly long-acting events of catastrophic proportion do not destroy personal economic motives. Together, and with other events such as the post-World War II rebuilding of severely damaged economies with equally wrenched social and political orders, they suggest that the question of whether individuals and societies will continue under such trying circumstances to participate in organized economic exchanges, known as markets, may be replaced profitably with questions of what interferences to ordinary market forces such disasters will impose, how those events will interject themselves into individuals' persistent efforts to create markets and participate in exchanges. Wars, plagues, and other widespread disasters make exchange more difficult, trade more dangerous, reduce stocks and flows and cause major price rearrangements that may confuse observers. Economic activity is made more difficult, but exchange is a method of survival as well as a means to enjoy life more fully, and humans evidently have had a capacity to seek enjoyment in even the most trying of circumstances.

The remaining chapters of this report rest on this conclusion. They examine the international linkages of the U.S. economy in peacetime calms and crises and one wartime situation to determine what elements of those links are likely to change, how they might change according to hostile conditions, what the consequences of the changes might be, and what might be--and should not be--done to correct or compensate for the changes. If a reader believes that the fundamental psychology of the economic agents described would be altered by the circumstances of the nuclear disaster, the discussion in the following chapters may appear to assume too much. However, if the "propensity to truck and barter" is believed to be natural among man, or at least robust, the study offers some useful insights for planning.

2. THE U.S. DOMESTIC ECONOMY AND THE INTERNATIONAL ECONOMY AN OVERVIEW

2.1. INTRODUCTION

This chapter discusses the changing relationship between the U.S. domestic economy and the international economy in the recent past, emphasizing both the domestic economy's importance to international economic activity and its increasing reliance on it. The purpose of the chapter is to lay the foundation for the discussion in the remaining chapters of the report. The chapter is organized around two broad aspects of international economic activity: (1) real trade issues and (2) international financial issues.

In Section 2, real aspects of U.S. international trade are discussed. The focus is on U.S. trade flows and the changing nature of trade over the past decade. The discussion characterizes the increasing real linkages between the U.S. economy and the international economy over the past decade. The discussion is descriptive, presenting trends in domestic reliance on international markets over the past decade. The results are not used as the basis for making any assertions on the ability of the U.S. economy to recover from a generalized disaster. The use of predisaster international trade relationships to conjecture on the ability of an economy to recover from a large-scale disaster cannot be justified. The recovery question is much more complex, involving such issues as (1) the pattern of destruction in the economies of both the United States and its traditional trading partners, (2) the surviving labor-capital composition, and (3) the feasibility of using expedient production processes in, at least, the immediate postdisaster period. However, the discussion does provide an indication of the growing reliance of many economies on U.S. markets for their exports. That reliance has important implications for aggregate international economic activity in the aftermath of a nuclear disaster in which the U.S. economy is seriously damaged and, hence, output is significantly reduced.

The section includes a discussion of both the U.S. balance of trade in the 1980s and the changing composition of that trade. To illustrate the latter phenomenon, three areas are explored. The first is the changing composition of U.S. trade over the past decade by geographical source. The discussion will illuminate the increasing reliance on countries in Asia as a source of U.S. imports over the past decade. The second area is the changing composition of U.S. imports by major product categories over the past decade. The key result here is the increasing percentage of U.S. merchandise imports accounted for by capital goods (especially machinery) and consumer goods (autos and other nonfood consumer goods). The final area is a discussion of the increasing importance of imports for 13 consumer and nonconsumer goods (measured as the ratio of imports to total domestic consumption) and the decline in exports for these same goods (measured as the ratio of exports to total domestic production).

Implicit in any discussion of trade flows is the system used to finance international trade; or, alternatively, the international monetary system. Because commodities are not bartered in international transactions, the flow of physical goods across international boundaries is inextricably linked to the method used to finance that flow. The financial or monetary aspects of international trade are the topics of Section 3.

Section 3 discusses the evolution of the international monetary system since the end of World War II. The section has two primary purposes. First, the international monetary system has evolved from a fixed exchange rate system, requiring a relatively large degree of international management, to a flexible exchange rate system, requiring less international management, since World War II. The section differentiates these types of systems, laying the foundation for discussion in later chapters. Second, the section illuminates the importance of the U.S. dollar in international economic activity.

The discussion in Section 3 is organized around three important features that characterize any system used to finance international trade. The first is the nature of the mechanism used to correct any imbalances in payments used to finance trade across international boundaries or, alternatively, the exchange rate system. At one extreme, a free floating or flexible exchange rate system can be used. At the other, a fixed exchange rate system can be used. The second feature of the system is the asset used for settlements of financial obligations because of differences in trade flows across countries. The third important feature of the international financial system is the method used to manage the system. Under a pure gold standard, for example, the system is self-managed. Under the fixed exchange rate system used from 1944 until 1971, a significant amount of management requiring the international cooperation of trading partners was required.

During periods of changing trade patterns, the second feature of the system takes on increasing importance; that is, a financial system must provide the international liquidity to accommodate trade changes. International liquidity is the amount of internationally acceptable assets held by countries for settling international balance of payments deficits. Presently, there are three components of international liquidity: gold, Special Drawing Rights (SDRs) at the International Monetary Fund, and reserve currencies. SDRs were created in 1969 to supplement gold as a reserve asset. The U.S. dollar is one of the most important reserve currencies.

Five topics are included in the discussion in Section 3. The first is the Bretton Woods conference held near the end of World War II which established the "gold exchange standard" as the mechanism used to

finance international transactions until 1971.[1] In August 1971, as part of President Nixon's New Economic Policy (NEP), the financial system created at Bretton Woods was effectively dismantled. The new system created as a result of NEP is the second topic discussed in the section. The third topic is the emergence of eurodollar markets and their importance in international economic activity. The fourth topic addresses the effects of the two oil price shocks of the 1970s and the subsequent emergence of "petrodollars" and "petrodollar recycling" in the international monetary system. These phenomena explain in large measure the international debt crisis of the 1980s. Finally, recent developments in the relationship between the U.S. economy and the international economy are discussed. One of the most important developments is the increase in foreign ownership of U.S. assets.

2.2. THE REAL SIDE: CHANGING TRADE PATTERNS

The single-most important indicator of the effect of the international economy on the U.S. domestic economy is the balance of trade. Although in principle the balance of trade statistics provide an indication of international influence on real and monetary domestic activity, they are measured and reported in various ways. Table 2.1 provides one approach to analyzing the balance of trade for the 1980-1986 period.

Table 2.1
U.S. Balance of Trade*
1980-1986
(In Billions of Current Dollars)

Category	1980	1981	1982	1983	1984	1985	1986
Merchandise	(25.5)	(28.0)	(36.4)	(67.1)	(112.5)	(122.1)	(144.3)
Services	57.6	61.9	72.7	61.0	53.8	43.2	41.0
GNP Net Exports	32.1	33.9	26.3	(6.1)	(58.7)	(78.9)	(104.3)
Transfers	(30.2)	(27.0)	(35.0)	(40.1)	(48.3)	(37.5)	(37.1)
Current Account	1.9	6.9	(8.7)	(46.2)	(107.0)	(116.4)	(141.4)

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business, Washington, D.C., June 1987.

*Numbers in parentheses indicate deficits or outflows of funds.

[1]As will be discussed below, the international financial system resulting from the Bretton Woods conference has also been called the "Bretton Woods System" and the "dollar standard."

Table 2.1 divides the current account, which is the best overall measure of the balance of trade, into three components: (1) merchandise trade, (2) productive services, and (3) transfers. The merchandise trade account is the net value of U.S. exports and U.S. imports of tangible commodities. Productive services include payment for the use of factors of production: land, labor, and capital. Included in the services account are travel, fees for professional services, and payments for services derived from physical capital. The latter includes the net amount of earnings from U.S. investments abroad and earnings from foreign investments in the United States. It does not include interest on federal, state, and local debt, which is considered a transfer in the data provided in Table 2.1. Other transfers include private contributions, foreign aid, and pension payments.[2]

Table 2.1 shows that the merchandise trade deficit has increased substantially in the decade of the 1980s from $25.5 billion in 1980 to $144.3 billion in 1986.[3] Historically, the United States has experienced surpluses in the balance of services because it has earned more on investments in foreign countries than foreigners have earned on their investments in the U.S. economy. Table 2.1 shows that, while this is still true, the amount of the surplus has declined in the 1980s from a peak of $72.7 billion in 1982 to $41.0 billion in 1986. As discussed in the next section, the reason for this deterioration is the increased amount of foreign assets in the U.S. economy, attributable in large measure to the balance of trade deficits in the 1980s.

Table 2.1 shows that, because of the large deficits in the merchandise trade balance, the U.S. economy has experienced deficits in GNP net exports since 1983, increasing from $6.1 billion in 1983 to more than $100 billion in 1986.[4] Because GNP net exports comprise one of the major components of U.S. gross output (along with consumption, private investment, and government expenditures), it can be interpreted as the effect of the foreign sector on U.S. output and, therefore, employment.

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[2]The components of the current account in Table 2.1 measure the annual flows of income or revenues. It should not be confused with the balance of payments which is, in essence, a double entry book-keeping system which measures both annual financial flows and changes in stock. The latter is comprised of the capital account and the reserve account. For any one year, the current account and changes in the capital and reserve account must net to zero--including statistical discrepancies. The capital account, as measured by the U.S.'s international investment position will be discussed in detail in Section 3.

[3]The last time the United States experienced a merchandise trade surplus was in 1975. In the 16-year period between 1960 and 1975, there was a merchandise trade surplus in 13 of the years.

[4]Prior to 1983, the last time the U.S. economy experienced a deficit in GNP net exports was in 1945. Since 1929, there was a deficit in only three war years--1943, 1944, and 1945--before the 1980s.

Table 2.1 also shows that the net amount of transfers out of the U.S. economy has increased since 1980. In part, this can be explained by the increasing amount of interest on the public debt paid to foreign holders. Finally, Table 2.1 shows that, because of the precipitous increase in the merchandise trade balance during the 1980s, the deficit in the current account increased precipitously from $8.7 billion in 1982 to $141.4 billion in 1986. The current account is the single-most important measure of the U.S. balance of trade because it signifies the changing net indebtedness of the U.S. economy to the rest of the world and measures the effect of international transactions on U.S. financial markets.

The remainder of this section addresses the changing composition of merchandise imports. Table 2.2 presents the total U.S. merchandise imports and the percent composition by geographical region for 1978 and 1986. In 1986, nearly 25 percent of the $368.7 billion in merchandise imports were derived from Western Europe; nearly 20 percent from Canada; and more than 40 percent from Asia--including Japan. The most significant change over the eight-year period presented in Table 2.2 is the pronounced increase in imports accounted for by Japan and the newly industrialized countries of South Korea, Singapore, and Taiwan. Japan's exports increased from under 14 percent in 1978 to nearly 22 percent in 1986. Similarly, the imports derived from the newly industrialized countries increased from 5.6 percent in 1978 to more than 10 percent in 1986.

The comparative data in Table 2.2 are significantly influenced by imports from OPEC countries--primarily crude petroleum and products.[5] In 1978, imports from OPEC countries accounted for nearly 19 percent of the total imports of $176.0 billion. Primarily because of the decline in the price of petroleum, the share of imports accounted for by petroleum decreased to a little more than 5 percent in 1986.

To offer a better understanding of the composition of imports and the role of petroleum, Table 2.3 presents the value of total merchandise imports in 1978 and 1986, disaggregated by the percentage composition by major product category. As noted in the footnotes, the data are presented both including and excluding the value of petroleum imports in 1978 ($42.3 billion) and 1986 ($33.8 billion).

The data in Table 2.3 show that, including petroleum imports, automobile-related imports accounted for more than 21 percent of the value of imports in 1986, up from 14.2 percent in 1978. Similarly, nonfood consumer goods increased from 16.4 percent of imports in 1978 to

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[5]The OPEC countries are Venezuela, Ecuador, Iraq, Iran, Kuwait, Saudi Arabia, Qatar, United Arab Emirates, Indonesia, Algeria, Libya, Nigeria, and Gabon.

Table 2.2
Total U.S. Merchandise Imports and
Percentage Composition by Geographical Source
1978 and 1986

Category	1978	1986
Total Merchandise Imports (10^6 Current $)	$ 176,001	$ 368,700
Regional Composition (%):		
Western Europe	20.80%	24.16%
Germany	5.66	6.66
Italy	2.33	2.81
United Kingdom	3.68	4.09
All Other	9.13	10.60
Canada	19.18	19.07
Japan	13.94	21.91
Australia, New Zealand, and South Africa	2.52	1.61
Eastern Europe	0.86	0.54
Latin America	13.09	11.24
Brazil	1.61	1.87
Mexico	3.46	4.66
Venezuela	2.04	1.30
All Other	5.98	3.41
Asia	20.27	19.36
OPEC	9.18	2.25
China	0.19	1.27
Hong Kong	1.97	2.38
Korea	2.13	3.47
Singapore	0.61	1.26
Taiwan	2.94	5.36
Africa	8.91	2.12
OPEC	7.27	1.17
All Other	1.64	0.95
Other	0.43	0.00
Total	100.00	100.00

SOURCE: Department of Commerce, Survey of Current Business, June 1987.

Table 2.3
Total U.S. Merchandise Imports and
Percentage Composition by Major Product Category

Category	1978		1986	
	With*	Without**	With*	Without**
Food, Feeds, and Beverages	8.75	11.52	6.51	7.16
Industrial Supplies	47.51	30.89	27.88	20.61
Energy	26.18	2.81	10.30	1.26
Nonenergy	21.33	28.08	17.58	19.35
Capital Goods	11.20	14.74	20.46	22.53
Machinery	10.48	13.80	18.35	20.20
Civilian Aircraft	0.56	0.73	1.88	2.07
Other Transport	0.16	0.21	0.23	0.26
Autos and Components	14.20	18.69	21.18	23.31
Nonfood Consumer Goods	16.44	21.65	21.10	23.23
All Other	1.90	2.51	2.88	3.17

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business, June 1987.

*Including petroleum imports.
**Excluding petroleum imports.

more than 21 percent in 1986. Therefore, total consumer goods--defined as the sum of autos and nonfood consumer goods--accounted for more than 42 percent of the value of imports in 1986, increasing from 30.6 percent in 1978. The other significant trend is the precipitous increase in the percentage of imports accounted for by capital goods, increasing from 11.2 percent in 1978 to 20.5 percent in 1986. The increase was attributable for the most part to machinery, which accounted for 18.4 percent of the value of imports in 1986.

Another revealing statistical comparison is the U.S. domestic economy's growing dependence on imports in specific sectors of the economy.Table 2.4 provides an indication of changing trade patterns for 13 manufacturing and consumer goods in 1981 and 1985. The table provides both the percentage of total domestic consumption of those commodities

Table 2.4
Percentage of Domestic Consumption Accounted for by Imports and Percentage of Domestic Production Accounted for by Exports
Select Commodities
1981 and 1985
(In Percentages)

Commodity	Imports/Consumption		Exports/Production	
	1981	1985	1981	1985
Radio and TV Sets	59	63	10	8
Shoes	33	58	2	3
Machine Tools	25	45	20	18
Semiconductors	34	40	35	32
Apparel	12	25	2	2
Steel Mill Products	19	24	3	1
Motor Vehicles	19	20	5	2
Farm Machinery	13	20	23	22
Photographic Equipment	15	19	16	14
Computers	7	18	29	29
Construction Machinery	9	16	41	21
Home Appliances	9	15	10	6
Home Furniture	7	14	2	1

accounted for by imports and the percentage of total production accounted by exports. The table provides an indication of both the extent to which the domestic economy is reliant on the international economy for the use of certain commodities and the growth of that reliance in the 1980s.

Table 2.4 shows that in addition to the two categories of consumer goods of radios and TVs and shoes, the domestic consumption of machine tools and semiconductors has been increasingly dominated by foreign sources since 1981. The percentage of domestic consumption of machine

tools accounted for by imports increased from 25 percent in 1981 to 45 percent in 1985.

Table 2.4 also shows that the demand for semiconductors is increasingly supplied by foreign sources. In 1985, 40 percent of domestic consumption was provided by imports. This phenomenon is attributable to several factors. First, U.S. semiconductor producers have increasingly established plants overseas to both reduce labor costs and increase access to foreign markets. Second, there has been increasing specialization in the industry. The Japanese, for example, dominate the market for 64K and 256K memory chips, while U.S. producers are dominant in custom chips and chips used in military and telecommunications applications.

With the advent of super-chips, the geographical composition of the industry is likely to change again. It is anticipated that, with the coming of mass production of these chips in the 1990s, more and more will be produced domestically. The reason is related to the size and intricateness of the new chips. Since there will be increased reliance on computers to mass produce the chips--in conjunction with highly skilled programmers to accomplish the task--it is anticipated that the necessary skills to produce the chips will be available domestically.

In terms of economic recovery, this trend is important for two reasons. First, over the past decade there has been a proliferation of use of automatic control systems in the economy. In many cases, it will be difficult for firms to operate those plants manually. The production of semiconductors is important in the control systems. Second, the production of semiconductors in the United States is concentrated in a few geographical areas which are themselves vulnerable to an attack. Moreover, Japan, the chief foreign supplier of U.S. semiconductors, is itself a potential target in a nuclear conflict. Therefore, sources of semiconductors in at least the immediate aftermath of a nuclear conflict are in jeopardy.

2.3. THE INTERNATIONAL MONETARY SYSTEM SINCE WORLD WAR II

2.3.1. The Bretton Woods Conference, 1944

The United States emerged from World War II as the dominant economic power in the world. At the end of the war, the U.S. had almost 75 percent of the world's gold supply. This observation explains in large measure the international financial system that emerged from a conference of the major allied nations in Bretton Woods, New Hampshire in 1944.

The motivating force for the conference was the desire on the part of major trading partners to create an international institution which would monitor and coordinate the exchange rate policies of the international trading community. The desire to have an institution to accomplish this was motivated by two prior crises in the international financial system during the 20th century. First, severe monetary

problems arose out of the payment of war reparations after World War I. Second, the international trade practices that characterized the years before World War II both contributed to and prolonged the depression in international economic activity by reducing international trade. In that pre-war period, economies throughout the world were faced with serious problems of declining growth and unemployment. To protect their domestic economies from eroding export earnings and increasing unemployment, many governments set self-serving exchange rates, unilaterally depreciating their currencies to discourage imports and promote exports. As a result there was extensive retaliation, a decline in international trade, and a prolonging of the international recession.[6]

Anticipating a proliferation of trade after the war and attempting to remedy past problems in the international community, the International Monetary Fund (IMF) was created at the Bretton Woods conference to serve as the conduit through which the international financial system would be coordinated and managed.[7] One of the primary functions given to the IMF was regulatory in nature: to serve as the international forum for determining and monitoring exchange rate practices. Besides its regulatory function, the IMF was given an important financial role under the Bretton Woods agreement. The IMF would advance funds to alleviate balance of payments deficits based on the rights each member has in the fund. Rights are determined on a quota system. Quotas are based on a formula which considers the amount of international trade, fluctuations in balance of payments, and the amount of international reserves of a country. Funding for the IMF is derived from capital subscriptions of the participating members, sales of gold, and borrowing.

Recalling the earlier discussion of features of the international monetary system, the primary asset that was to be used for settling payments imbalances was gold. However, under the international financial system that arose from the conference (the "Bretton Woods system"), the United States agreed to exchange gold for U.S. dollars at the stipulated price of $35.00 per ounce; hence, the system has been characterized as the "gold exchange standard" or the "dollar standard." Effectively, this

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[6]Problems with the international economy during the 1930s will be discussed at length in Chapter 4.

[7]The IMF was created as one of two international institutions that were to monitor and coordinate international trade. In 1947, 23 nations signed the General Agreement on Tariffs and Trade (GATT), which set rules on tariffs and trade policy. The International Trade Organization (ITO) was created as the organization that was to enforce the provisions of GATT. However, ITO was never fully received as an international organization. The articles of agreement gave the ITO such broad powers and responsibilities that, in 1950, the U.S. Senate refused to ratify the treaty establishing the ITO. Therefore, the IMF currently is devoted to the payments portion of international trade, while the executive agreement creating GATT is concerned with the real side of trade--tariffs and trade policy. Presently, more than 90 countries have signed the agreement.

made the dollar the most important international currency. The convertibility of the dollar into gold was maintained in principle only. Recognizing that holding a national currency of a politically stable and economically powerful country was relatively risk-free and, moreover, could be converted into gold at demand, the international community increasingly used the dollar as a reserve asset in place of gold to settle balance of payments deficits. A paper currency was much easier to conduct transactions with than shifting gold supplies internationally.

The third feature of an international financial system is the mechanism used to correct for payments imbalances. The exchange rate system established at Bretton Woods can be characterized as a fixed exchange rate system. Under the system, relative values for each of the national currencies were initially established by international agreement. National currencies could be exchanged for one another within one percent around these initial "par values." Furthermore, these relative values could only be changed by international agreement.

The internationally regulated par-value exchange rate system established at Bretton Woods can be contrasted with other types of self-regulating systems--a rigidly fixed exchange rate system or a flexible exchange rate system. An example of a rigidly fixed system is a pure gold standard. Under this system, gold is used both as a national currency for trading partners and as the standard for settling international transactions. If a country experiences a trade deficit, its total supply of gold--used for both domestic and international transactions--would decrease, resulting in a contraction of domestic economic activity and a reduction in the price level. Ultimately, the trade balance would improve with a consequent inflow of gold. Since the adjustment to correct trade imbalances under the pure gold standard is in the domestic economies of trading partners, the system is self-regulating.[8]

A flexible exchange rate system is also conceptually self-regulating. Since the demand for a country's currency is derived from the demand for its products (exports), any trade imbalance is automatically corrected because the deficit country's currency will depreciate to a point where its increase in exports and decrease in imports will correct the trade imbalance.[9]

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[8]A pure gold standard has never existed in the international economy. The use of national currencies to settle international transactions facilitates the functioning of commerce. However, as with the Bretton Woods system established in 1944, governments have guaranteed the convertibility of their currency into gold.

[9]As discussed below, a free-floating or free-flexible exchange rate system has been used in the international financial system since 1973.

2.3.2. The New Economic Policy (NEP)

The Bretton Woods system or gold exchange standard served as the international financial mechanism for a period of unparalleled international trade growth after World War II. However, the cornerstone of the system--gold as the primary reserve asset--was not suited to the increases in international liquidity that were required to support the growth in international trade. The amount of monetary gold simply was not sufficient to keep pace with the growth in international trade. Consequently, the U.S. dollar--because it was in principle convertible to gold and issued by the dominant economic power--increasingly played the role as the primary reserve currency. The trade deficits that the United States was experiencing at the time accounted for more than two-thirds of the increase in international reserves during that time.

Recognizing (1) the inadequacies of monetary gold supplies to increase international liquidity, (2) the growing gold-dollar imbalance and (3) the possibility of an end to U.S. trade deficits which were in large measure financing increases in international liquidity, international monetary authorities searched for a new reserve asset during the 1960s.[10] In 1969, the first amendment to the Bretton Woods charter was ratified, creating a Special Drawing Account at the IMF. The account was the source of Special Drawing Rights (SDRs) for member countries of the IMF, which were to serve as a new reserve asset to supplement gold and substitute for national currencies to settle balance of payments deficits.[11]

However, it was soon realized that SDRs were not going to displace the U.S. dollar--backed by gold--as an international reserve asset. The trade deficits that the United States was experiencing during the period were a source of dollars for its trading partners. Besides its convertibility into gold, dollars were in demand as a reserve asset because of the confidence held in the American political and economic system. Under these circumstances, the new international reserve asset--the SDR--simply could not supplant the dollar as an international reserve asset.

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[10]Rather than creating a new reserve asset, another possible solution to the international liquidity problem would have been to increase the price of gold from its guaranteed price of $35/ounce. This option was considered, but the idea abandoned because, among other disadvantages, an increase in the price of gold would be to the benefit of some countries, but to the detriment of others. It was, therefore, politically infeasible.

[11]As such, the initial valuation of SDRs was one thirty-fifth of an ounce of gold or, alternatively, one U.S. dollar (since the official exchange rate of dollars to gold was $35/ounce). Also, the interest rate on the SDR was set at 1½ percent.

However, as long as U.S. dollar liabilities in relation to gold were minor, the system could succeed. As the reserves of foreign exchange denominated in U.S. dollars increased significantly and the monetary gold stock did not keep pace, an international financial system based on the convertibility of the dollar into gold was in jeopardy. In the quarter of a century following the Bretton Woods Conference, the U.S. supply of gold diminished from $25 billion to $12 billion. Simultaneously, dollar-denominated liabilities rose to $46 billion. This discrepancy and the requirement that dollars be converted into gold at $35 per ounce led to the demise of the dollar or gold exchange standard implemented at Bretton Woods in 1944.

In August 1971, President Nixon announced his New Economic Policy (NEP) which terminated the convertibility of the dollar into gold, allowed the dollar to float freely in currency markets, and placed a 10 percent surtax on all imports. Since one of the main features of the Bretton Woods system was the dollar's link to gold, President Nixon's decision not to accept dollars for gold--and the reality that the U.S. gold supply could not accommodate all of the dollars in existence--effectively ended the Bretton Woods system of international finance which began in 1944. However, use of dollars accumulated during the Bretton Woods years as a reserve asset was not ended by the August 15 announcement. The dollar still was to play a significant role in the international monetary system because of trading nations confidence in the strength of the U.S. economic and political system.

During the months following Nixon's announcement, a multilateral realignment of exchange rates was negotiated between the major trading partners. The result of those negotiations was the Smithsonian agreement which was signed in December 1971. Under the agreement, par values were established for the major currencies and it was agreed that foreign exchange transactions could be undertaken within 2 1/4 percent of that value (as opposed to the one percent margin under the Bretton Woods system). However, events over the next two years proved the nonviability of the Smithsonian agreement--a fixed exchange rate system with no guarantee of a national currency convertible into gold--and the agreement was effectively abolished in 1973. Thus, less than 30 years after the Bretton Woods agreement, the fixed exchange rate system was abandoned for a free floating system. International management of currency exchange rates was abandoned and the monetary role of gold was ended.[12]

2.3.3. The Emergence of the Eurodollar Market

An important manifestation of the dollar standard that furthered the prominence of the U.S. dollar in the international financial system was

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[12]Besides these events, the U.S. government further signalled its intention to end the monetary role of gold in the international financial system by revoking a 41-year ban on the private ownership of gold on December 31, 1974. Moreover, on January 6, 1975, the U.S. started auctioning a portion of its gold stock on the open market.

the rise of eurodollar markets beginning in the 1950s. A eurodollar is a special case of a eurocurrency in which a deposit is made in a bank in a currency that differs from the national currency of the banking institution. In the case of eurodollars, it is simply the deposit of the American dollar in foreign banks, denominated in the U.S. dollar. The distinguishing characteristic of a eurodollar deposit from a regular dollar deposit is that it creates a liability in American dollars by banks located outside of the United States, which may or not be foreign branches of U.S. banks.

The emergence of eurodollar markets was the result of several factors. One factor was that European countries increased their holdings of U.S. dollars during the reconstruction of Europe after World War II under the Marshall Plan. These holdings were later increased when the United States experienced balance of payments deficits. Because of the dollar's convertibility into gold, its acceptance by European banks was enhanced. European banks found it convenient to accept U.S. dollar deposits because the dollar was increasingly used as an international money. In many respects, holding of dollar assets eliminated the need for foreign currency transactions. Also, from a business standpoint, dealing in dollar-denominated assets was profitable because the assets generated a return.

Another factor which significantly contributed to the prominence of the eurodollar market was the increasing scale of operations of U.S. multinational corporations in Europe.[13] It was both convenient and profitable for many multinational corporations to hold funds denominated in dollars in European banks--rather than in U.S. banks--to finance their European investments.

Another important contributing factor to the proliferation of eurodollars was the restrictions on capital outflows placed in the domestic economy beginning in 1964 and continuing to January 1974. The restrictions were manifested in the Interest Equalization Tax, the Voluntary Foreign Credit Restraint Program. and the Foreign Direct Investment Program. These restrictions increasingly led borrowers from domestic to foreign sources for dollar-denominated financing. The enactment of the Interest Equalization Tax in 1964 to protect the U.S. balance of payments was instrumental in the growth of eurodollar markets. The object of the legislation was to reduce foreign securities issued in New York by increasing the cost to foreigners of long-term financing in U.S. capital markets.

Presently, it is estimated that there are more than $2 trillion of eurodollars in existence [Pool and Stamos (1987)]. The growth in eurodollars was accomplished in part because of the lack of reserve requirements of European banks. Therefore, dollars deposited in foreign banks can be expanded outside of the control of U.S. banking authorities.

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[13]The multinational corporation will be discussed at length in Chapter 6.

The existence of such a large amount of U.S. dollars in eurodollar markets has the obvious significance of increasing the importance of the U.S. dollar in the international financial system.

2.3.4. Oil Price Shocks and the International Debt Crisis

The most significant events since the abolishment of the Smithsonian agreement were the oil price shocks of the 1970s. The price of a barrel of oil increased from $1.30 in 1970 to $28.67 in 1980. Since a vast majority of the oil trade is carried on using the U.S. dollar, this event further led to the importance of the U.S. dollar in the international financial system.

The rapid increase in the price of oil also led to one of the largest transfers of wealth in history primarily from the oil-importing industrialized countries to the Middle Eastern countries. Faced with a massive infusion of "petrodollars" and the potential for severely disrupted domestic economies if the petrodollars were used domestically, the Middle Eastern countries had no choice but to find external investment sources. The most attractive candidates for investment were the industrialized countries themselves because of their relatively stable economies. Hence, a large portion of the petrodollars were recycled back to oil-importing industrialized economies ("petrodollar recycling"). The deposits in European banks further increased the eurodollar liabilities of those banks.

With a large infusion of petrodollars, the banks themselves were looking for profitable sources of investment. The combination of an international recession and high interest rates made third-world loans the most attractive. The industrialized countries rate of growth was slowed and, consequently, the demand for the exports of the third world declined. Faced with declining demand for exports and an increase in oil import bills, the payments position of many developing economies was in serious trouble. This phenomenon in concert with the petrodollars placed in banks in industrialized countries led to a massive lending of petrodollars to developing nations. This was the conditioning force behind the current international financial crisis because of the inability of many third world countries to service their obligations to banks in the industrialized countries. Most recently, this series of events has led to the prospect and threat of defaults on loans from the developing countries--the worst case perhaps is the Mexican crisis of 1982.

Most recently, the persistent U.S. trade deficits have plagued the international economy. Theoretically, when a country runs a trade deficit under an international exchange system that is not managed or fixed--the floating system in existence presently--the country's exchange rate will depreciate, leading to a decline in imports and an increase in exports and a correction of the trade imbalance. However, partially because of the level of interest rates in the United States, the confidence placed in the U.S. economy and political system, and the domestic policies of major trading partners, the balance has not been

corrected in this case. The dollar demand for capital flows has offset the forces from the trade imbalance to keep the value of the dollar from depreciating. To correct this, the five largest industrial nations--the United States, Japan, France, West Germany, and Great Britain--agreed in September of 1985 to an informal system of exchange rate management.

2.3.5. Current Developments

The international financial system has undergone a dramatic change since the termination of hostilities in World War II. From 1944 to 1971, the system operated relatively smoothly under the dollar standard or gold exchange standard because of the use of the dollar as the prominent currency in international financial relationships. When in 1971, the dollar's convertibility into gold became untenable, a search for a new asset to play a central role in international reserves was sought. The use of the SDR has not lived up to its expectations. Gold as money is not as prominent as it once was. The dollar remains so. The rise of the eurodollar market in the 1960s and the oil price increases of the 1970s--and subsequent events--have further solidified the position of the U.S. dollar as the prominent international currency.

The U.S. dollar plays a dual role in the international economy--it is both a national and an international currency. It is used to price most internationally traded raw materials, including the majority of petroleum transactions. At least one-half of all international bank and bond loans are in dollars. More than two-thirds of international foreign exchange reserves are accounted for by the dollar.[14] While the dollar's role as an international "supercurrency" is advantageous for financing of U.S. imports, its use as such gives U.S. monetary policy a significant role in international economic activity. Although exact data are not available, it has been estimated that the eurodollar markets contain more than $2,000 billion in U.S. dollars. To place that in perspective, that amount is approximately equal to the U.S. domestic money supply.

In the context of planning for economic recovery, another important recent development is the attempt to "internationalize" the yen. Next to the United States, Japan has the largest capital markets (stock and government bond markets) in the world. Two factors have accounted for the increasing prominence of the yen in the international financial system.

The first factor has been the willingness of the Japanese to encourage development of the euroyen market. Additionally, they have deregulated their financial markets and relaxed restrictions on the flow of funds both into and out of Japan. Second, the Japanese have been

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[14]The use of the dollar in international transactions is facilitated by the Clearing House Interbank Payments System (CHIPS). Initiated in 1970, CHIPS transfers by computer more than $400 billion per day from international banking center to international banking center to finance trade and investment and settle international payments imbalances.

running huge trade surpluses, accounted for in large measure by trade with the United States.

One of the most significant trends in the U.S. economy in recent years has been the increasing ownership of U.S. assets by foreign interests. To illustrate this phenomenon, Table 2.5 presents the U.S. international investment position for select years from 1971 through 1986. As noted in the table, there was a deficit of $111.9 billion in the net investment position of the United States in 1985. That deficit in the capital account increased to more than $263.6 billion in 1986.[15] Simply, that means that foreign claims on U.S. assets (U.S. liabilities) exceeded that of foreign liabilities and the United States is a net debtor nation for the first time since 1914.

Table 2.5 shows that U.S. foreign liabilities (foreign assets in the United States) increased nearly three-fold from 1980 to 1986--from $500.8 billion to $1,331.5 billion. The liabilities are divided between government-held liabilities and liabilities to the private sector. One of the most significant aspects of the data in Table 2.5 is the changing composition of liabilities to those two sectors. In 1971, U.S. liabilities to foreign governments was $52.5 billion--or 39.3 percent of the total. By the end of 1986, that percentage decreased to 18.1 percent. Moreover, the percentage decreased from 35.2 percent in 1980 to 18.1 percent in 1986. Thus, the foreign private sector has accounted for the increased U.S. foreign liabilities.

The composition of private-sector assets in Table 2.5 is divided between direct investments and portfolio investments. While the distinction is somewhat arbitrary, the former refers to investments in foreign affiliates and the latter refers investments in which there is no effective control obtained by the investor--corporate bonds, stocks, and other securities. The critical factor for being categorized as a direct investment is obtaining at least 10 percent control of a firm. The value of direct investments in 1986 was $209.3 billion. Of that amount, European countries accounted for 67.7 percent of the total. The United Kingdom and the Netherlands account for the major share. Other significant countries were Japan (11.2 percent of the total) and Canada (8.8 percent).

Although direct investment in the United States by the private sector increased by nearly 2½ times from 1980 to 1986 (from $83.0 billion to $209.3 billion), Table 2.5 shows that the primary element of the increased percentage of the private sector's share of investment in the United States from 64.8 percent in 1980 to 81.9 percent ($324.8 billion

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[15]The official figures are misleading for a number of reasons. U.S. direct investment and gold holdings are reported at book rather than market value. If consideration were given to the market value of those foreign assets held by the U.S.--an the market value of foreign assets in the United States--in all likelihood the amount of the deficit would be significantly reduced.

Table 2.5
International Investment Position of the United States
Select Years
1971-1986

(In Billions of U.S. Dollars)

Category	1971	1975	1980	1981	1982	1983	1984	1985	1986
Net Investment Position*	45.5	74.2	106.3	141.1	137.0	89.6	3.6	(111.9)	(263.6)
U.S. Assets in Foreign Countries	179.0	295.1	607.1	719.8	824.9	873.9	896.1	949.4	1067.9
Foreign Assets in United States	133.5	220.9	500.8	578.7	688.0	784.3	892.5	1061.3	1331.5
Official (Government)	52.5	86.9	176.1	180.4	189.1	194.5	199.2	202.5	240.8
U.S. Treasury Securities	44.4	61.1	111.3	117.0	124.9	129.7	135.5	135.7	170.7
Other	8.1	25.8	64.8	63.4	64.2	64.8	63.7	66.8	70.1
Other (Private)	81.0	134.0	324.8	398.3	498.9	589.8	693.3	858.8	1090.7
Direct Investment	13.9	27.7	83.0	108.7	124.7	137.1	164.6	184.6	209.3
U.S. Treasury Securities	1.2	4.2	16.1	18.5	25.8	33.8	58.2	33.6	96.0
Corporate and Other Bonds	9.4	10.0	9.5	10.7	16.7	17.3	32.8	82.5	142.1
Corporate Stocks	30.8	35.6	64.6	64.4	76.3	96.4	94.6	124.1	167.4
Other	25.7	56.5	151.6	196.0	255.4	305.2	343.1	384.0	475.9

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business, June 1987.

*Difference between U.S. assets in foreign countries and foreign assets in United States. Figures in parentheses indicate deficits.

Figures may not add due to rounding.

to $1,090.7) was the increase in its portfolio investment. Foreign purchases of U.S.-issued bonds increased nearly 15 times from 1980 to 1986 ($9.5 billion to $142.1 billion); that of U.S. treasury securities nearly 6 times ($16.1 billion to $96.0 billion); that of corporate stocks more than 2½ times; and the other category more than 3 times ($151.6 billion to $475.9 billion).[16]

As discussed in Section 2.2.1, one of the primary reasons for this large increase in capital inflows has been the proliferation of U.S. trade deficits, especially since 1982. In 1986, for example, the deficit in the current account was $141.6 billion in comparison with $107.0 billion and $116.4 billion in 1984 and 1985, respectively. The increased availability of the American dollar internationally due to trade deficits has resulted in a large foreign capital inflow.

There are obviously other contributing factors to this net capital inflow. A significant factor is the U.S. tax laws. In general, the laws are more favorable for both direct and portfolio investments than the laws in other industrialized countries. Moreover, the U.S. economic and political system is viewed as relatively more stable than other countries.[17] The increase in direct investments is attributable to a number of other factors. Besides favorable tax laws, a direct investment in the United States can be viewed as gaining access to a potentially larger customer base. The U.S. economy is simply the largest in the world. Ironically, another factor contributing to the increase in direct investments is the trade deficits themselves. The overwhelming trade deficits have sparked discussion and submission of protectionist trade legislation in Congress. By directly investing in the United States, foreign interests are able to hedge against that possibility.

The large capital inflows, although increasing the liabilities of the United States to the rest of the world, are not without benefits. Indeed, the large internal deficits run up by the U.S. government in the 1980s have been increasingly financed by foreign capital. Table 2.5 shows that the foreign holding of U.S. Treasury securities by government and private sources combined more than doubled from 1980 to 1986 (from $129.4 billion to $266.7 billion).[18] Without this increase in foreign

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[16]The other category is comprised of real estate investments, commercial interests, and bank liabilities not included elsewhere. Of the $475.9 billion in 1986, $449.2 billion was accounted for by the latter category.

[17]As discussed in the previous section, this is a direct counterpart to the holding of the U.S. dollar as a reserve currency. On balance, it is viewed as a relatively less risky investment.

[18]Through the second quarter of 1986, net foreign purchases of U.S. Treasury securities accounted for 22 percent of all offerings. The corresponding percentages for 1983 through 1985 were 4 percent, 13 percent, and 19 percent, respectively.

financing of the U.S. internal deficit, interest rates almost certainly would be higher, private investment in the United States lower, and economic growth slowed.

3. THE REAL SIDE OF FOREIGN TRADE

3.1. INTRODUCTION

The ultimate basis of the physical well-being of consumers is the consumption of goods and services. So, in a sense, the subject matter of this chapter is the ultimate concern of this study: what changes in foreign trade is the United States likely to experience as a result of a nuclear exchange, and what policies could enhance recovery? Of course, we cannot say exactly what will happen to foreign trade as a result of a nuclear war, but we can identify the sorts of changes that are likely to occur and discuss analytical issues regarding those types of change.

We begin from the perspective of the foundations of foreign trade: if the current foundations of foreign trade were changed by a nuclear attack, what does the theory that relates those foundations to patterns of trade between countries suggest may happen to trade patterns and associated economic phenomena? We discuss possible results of changed comparative advantage attributable to altered relative factor abundances in countries, changed relative technological structures, and changes in domestic industrial structures. The latter are important in intraindustry trade. Additionally, we discuss policy options affecting foreign trade that may enhance recovery.

No study of the impacts of a nuclear exchange on foreign trade could afford to ignore the possible atmospheric and climatic consequences on agriculture and thus on international trade in food. We consider issues regarding that possibility in this chapter.

In Chapter 5, we will discuss the prospects of postattack international capital mobility, but we will not consider the possibility of labor movement in that chapter. In this chapter, we consider the possible inducements to labor migration as they may affect the United States. Particularly, there is the possibility of replacing American labor losses with spontaneous migration from Mexico and Central America, which already substantially contributes to the American labor force in certain parts of the country, although largely undocumented. Additionally, we consider the possibility of a "brain drain" in the United States, especially if American technological and R&D capacity are seriously damaged.

We make a clear distinction between two types of foreign trade issues: (1) trade in the immediate aftermath of an attack, which will involve primarily exchange of goods already in inventories, possibly with some new production, but which will not involve structural production responses to new patterns of comparative advantage; and (2) the longer-term evolution of a new foreign trade structure of the United States which involves responses to altered patterns of relative resource endowments. Since the most popularly conceived issues in postattack

foreign trade may involve the first category almost exclusively, we first turn our attention to that subject.

3.2. ATTACK AND DESTRUCTION PATTERNS

It is difficult to organize analytical issues involving real trade without considering some characteristics of possible attack patterns. Consequently, we consider some attack patterns here to help organize the analytical discussion in Chapter 7. We de-emphasize an attack pattern in which all the major cities of the Western world and the Soviet Union are targeted and destroyed. Three other attack patterns are considered. The first is a series of local, tactical nuclear strikes against front-line forces and/or rear area military targets in Europe or another scene of initial, conventional hostilities. In such a pattern, damage to civilian property would be minimal, although damage to transportation networks and possibly urban port facilities might be extensive and have some spillover into the civilian arena.

The second is a pattern of strategically directed nuclear attacks on critical production facilities in the United States and allied nations, such as refineries and petroleum transportation facilities, munitions factories and closely linked facilities, and electronic equipment production and assembly facilities. These attacks clearly would involve civilian sectors, but may not result in the total destruction of entire urbanized areas such as greater New York or greater Los Angeles, although extensive damage to some cities cannot be ruled out. The possibilities of inaccurate missile strikes does, however, bring up the possibility of more civilian damage. This type of attack pattern is called a "countervalue" attack.

The third attack considered here is a counter-missile targeting, again in the United States and possibly against such facilities in allied countries. Such a strike pattern would hit rural areas primarily and could entail damage to adjacent agricultural areas. Off-target missiles still may be expected to miss major urban population centers. This type of attack pattern is called a "counterforce" attack. These three attack patterns would not necessarily be mutually exclusive, and indeed, the last two probably would be conducted in tandem (see Luttwak, 1985, pp 120-24).

In addition to the geographical and sectoral pattern of strikes, assessment of likely magnitudes of strikes is necessary for a discussion of analytical issues in postattack trade. From a strategic perspective, smaller individual payloads are far more plausible than 20-megaton continent busters, and in fact, Soviet weapons currently are getting down to the one-half to one megaton range, and may be expected to get even smaller (Luttwak, 1985, p. 124).

An example of a relevant question is, "Would an on-target strike on a refinery one mile outside the suburban ring of a city of one half million population destroy the city or a major portion of it?" The answer to this question has implications for both the extent of damage to

the targeted sector and the extent of incidental damage to untargeted sectors and to the general population. It has implications also for the magnitude of long-run changes in the post-attack economy: could the industrial composition of an attacked country look the same again within a relevant planning horizon, or are such countries destined to take different development and growth paths for several hundred years because of the extent of damage to both capital stocks and populations? Germany and Japan suffered extensive physical damage in World War II but lost relatively small proportions, if absolutely large numbers, of their populations. Within fifteen years, their economies were largely rebuilt, and within thirty years they were in the forefront of the world's industrial giants. Clearly, the assistance of undevastated countries, particularly the United States, was of prime importance in the regeneration ability of Germany and Japan, and the existence of relatively undamaged countries who are willing to assist in rehabilitation of heavily damaged countries would be of first importance in recovery from a nuclear war.

Of particular importance is the possibility of a relatively controlled character of nuclear strikes. Two important conclusions emerge from this possibility. First, direct deaths in the civilian population would be incidental rather than indiscriminate. Population losses might be absolutely large, but probably would not be large proportions of national populations. Second, long-run, fundamental changes in the structure of national economies are not likely, if for no other reason than that populations would survive largely intact. People are the ultimate resource, and they can rebuild destroyed capital stocks, as recent experience has demonstrated. Although more remote, we cannot rule out the possibility of devastating attacks against populations, which would leave national economies more fundamentally altered.

3.3. NUCLEAR WINTER AND INTERNATIONAL TRADE IN FOOD

Any discussion of international trade in the immediate postattack period must first address the potential biological and meteorological effects of nuclear weapons, a phenomenon referred to as nuclear winter. Under that scenario, smoke and dust created by nuclear strikes will cause a temperature depression, known as nuclear winter, and alteration in rainfall. The severity of the temperature drop depends on the time of year of the strikes, among other factors. A spring or summer strike could lower temperatures in the northern hemisphere by ten to sixteen degrees centigrade while a winter strike could lower it by as little as three degrees centigrade. The length of the temperature depression, as well as the extent of the depression depends on the magnitude of the exchange and on the attack pattern. A counterforce strike would produce primarily grass and forest fires, which would emit far less smoke and dust than a countervalue strike at cities. Additionally, the cooling effects of any given smoke and dust emission would be more severe at higher latitudes (see Chester, Perry, and Hobbs, 1987, for a review of the range of estimates).

In addition to the climatic influences on potential crop failure following a nuclear exchange, radiation hazards could keep farmers out of their fields as critical times, preventing such operations as plowing, tilling, weeding, and/or harvesting. Consequently, depending on the timing, character, and magnitude of the exchange, a year's crops could be lost in both the United States and Canada as well as in the Soviet Union. Temperatures could fall later in Australia and Argentina as well. Depending on subsequent effects on rainfall, a second year's crops also could be damaged.

Any food trade in the first two years after a nuclear exchange that produced nuclear winter effects would be highly dependent on the climatic consequences of the particular strike. Both the United States and the Soviet Union have sufficient grain stores to survive a two-year crop failure, but the United States and Canada, in particular, have been major food suppliers to many parts of the world, particularly the developing countries, that are not self-sufficient in food. World food prices clearly would increase as a consequence of major crop failures in the United States and Canada, and many poor countries could ill afford such increases. How much food the United States could export from its stocks is an open question. Some of the stocks would be under direct government control, but others would be under private control, and export restrictions might be required to prevent their export if the government desired to retain them for domestic use; otherwise, the market will dictate their consumption. Prices in poor, developing countries might not be high enough to attract food imports without loans or grants from the developed countries. Africa could be particularly hard hit. If the countries of the western alliance were especially heavily damaged, say from extensive attacks against populations, they might be net food importers themselves and in poor position to assist developing countries.

The common assumption that international food prices, particularly grain prices, would rise sharply in the aftermath of a major nuclear exchange needs further examination. Some of the great famines of the past fifty years have been accompanied by no discernible increases in food prices in the affected areas. In fact, it has been argued that the reason the famines reached the proportions they did was that local prices never signalled a food shortage. Examination of these cases has shown that the affected populations derived most of their income from farming, and that when their crops failed, they had no income with which to purchase food from outside (Sen, 1981a, 1981b). The famines occurred more because of local income failure than because of even relatively nearby food unavailability.

Under scenarios of major industrial destruction in Europe, it is entirely possible that this sort of situation could occur in Europe after a nuclear, or even a particularly destructive conventional, war. Without something to trade internationally for food, presumably manufactured goods since agriculture is assumed to have been largely destroyed at least for the short term, the European demand (as contrasted with wants or needs) for imported food would be much lower than is commonly assumed. If European debt instruments retained their credibility, internationally

negotiable credit could be used to import food. However, it is not obvious, although it is not necessarily impossible, that such financial credibility would survive, particularly in the short term. Even if it did, substantial inflationary potential would accompany it since much of the real backing of the claims would have been destroyed. Additionally, if the United States accepted such paper claims, manufacturing producers in other nations would have to be willing to accept such claims at little more discount than American food sellers required in order for the United States to effectively convert its food exports to Europe into imports of needed manufactured items.

If the major southern hemisphere and South and Southeast Asian foodgrain producers did not experience significant reductions in their agricultural outputs, the reduction in world food supplies caused by the elimination of European agriculture might be little greater than the reduction in world demand. If Japan were attacked, it would suffer relatively greater damage to its direct manufacturing consumption capability than to its direct food consumption capability simply because the latter is so small; Japan is a major food importer. If its industrial supply capacity were greatly reduced, it could find itself in the same situation as Europe. It is entirely possible that world food prices could fall nearly as sharply as they are commonly predicted to rise because the aggregate manufactured-goods basis of food demand is sharply reduced while food supplies are far less sharply reduced. Sharp reductions in demand for meat would increase grain supplies available for direct human consumption, driving foodgrain prices down even further.

This is a bleak picture, but it would be mitigated to the extent that European industrial capacity survives. In such a scenario, food aid to assist manufacturing recovery, both domestically and overseas, may make as much sense as trying to sell foodgrains in a severely depressed international market.

A scenario of a selective countervalue strike in Europe as well as in the United States and Soviet Union would (and a counterforce scenario involving Europe might) produce the sharp foodgrain price rise commonly predicted, but negative income effects on food consumption would be much stronger in the United States and the Soviet Union than in Europe and Japan simply because those two countries' domestic bases of food demand--manufactured goods--would be so sharply reduced.

3.4. FOREIGN TRADE IN THE IMMEDIATE POSTATTACK PERIOD

Consider a nuclear exchange involving strikes against American missiles and critical production facilities. Such an attack on the United States, or even on its trading partners alone, could involve extensive destruction of goods and capital, and to a lesser extent people. Routine demands for goods and services within the United States would be interrupted; some demands might cease to exist as the sources of demand are destroyed or severely damaged, and some might continue at roughly the preattack rate but lose their customary sources of domestic

and/or foreign supply. Foreign sources might be sought to replace damaged or destroyed domestic supply sources. Demands in foreign countries may experience similar interruptions. As a consequence, the United States may be turned to as a potential supplier of goods that its trading partners traditionally supplied for themselves. Finally, customary trade may be interrupted through disruption of transportation and/or communications and/or by destruction of supplying and/or demanding agents. The plethora of "and/or" indicates the large number of possible patterns of disruption.

From the point of view of the United States as a consumer, immediate postattack foreign trade may involve goods previously imported but probably would include an array of goods previously supplied domestically. An analogous situation might arise from the point of view of the United States as a producer: the United States might be called on to supply goods overseas which it did not export previously. In addition, the pattern of trading partners could be expected to change. None of these changes necessarily would have implications for long run patterns of foreign trade during a sustained period of recovery, but rather would be fortuitous consequences of destruction patterns.

In the immediate aftermath of an attack, the vast majority of foreign trade will involve the exchange of previously produced stocks. New production will take place in preattack locations, possibly with slightly altered production processes because of damage to capital stock and/or altered availability of the cost-minimizing inputs. In this short period after an attack, there will be insufficient time for altered national and international resource endowment patterns to reveal themselves sufficiently to warrant investment in different types of production facilities around the world. There also will be inadequate time and higher priority things to do. So, geographical patterns of production may be reduced because of hostile action, but probably not because of economic decisions to halt production. Neither would geographical production patterns experience additions to production facilities during this time. On the other hand, the geographical pattern of suppliers to any particular country could be expected to change in this period. For instance, traditional suppliers of commodity x to the United States may be damaged, leading the United States to find another supplier or an input substitute. Alternatively, surviving firms in the United States may be approached by new demanders who have lost their supply sources in other countries.

In this period, commodity prices will be the primary adjustment mechanism. Curtailed availability of usual inputs and limited information on substitutes and alternative production methods will restrict price-induced input substitution as a major adjustment mechanism in production during this period of disorder, characterized by poor information and communication. Prices of both inputs and commodities may reflect the local scarcity of information as much as they do the regional or global scarcity of the goods themselves. This, however, would be no justification for government control of prices. There are no grounds for

presuming that government information sources would be superior to private ones, as we discuss later.

A major problem in maintaining or re-establishing foreign trade will be in communicating demands to suppliers. Communications probably will be difficult, and we gauge that this will be a more crucial problem to solve than actual production itself. As we note in Chapter 6, we anticipate that multinational corporations will have an advantage over strictly domestic firms that purchase or sell overseas because their internal information systems cross national borders. Many multinationals are vertically integrated internationally and may be able to find stocks of demanded goods in one of their affiliates. If their affiliates have no stocks, one or more of those affiliates very well may have access to outside local suppliers in relatively undamaged areas of the world.

The principal types of information required to sustain survival during this period would involve quantities of goods (inputs and outputs) demanded at particular locations and quantities available at other areas. This is, of course, a domestic problem as well as an international problem. The communication of demands and supplies domestically may (but only may) be superior to international communication, but supply availability from overseas sources (i.e., outside the United States) may be superior to domestic availability, even for goods previously only domestically exchanged.

Finally, transportation will be impeded. Hostile action against ocean shipping would send insurance rates as well as sailors' compensations skyrocketing, and probably risk premia on the ships themselves. This would tend to curtail transoceanic international trade even if communications could identify overseas demanders and suppliers. If road systems permitted, that could encourage United States trade with Latin America in an array of goods currently not traded, although establishing new production in Latin America would involve a longer time horizon. Trade with Canada might also be encouraged by the ability to avoid ocean shipping, although Canada might be more affected physically by the strikes against the United States than Latin America would be. Air freight might be able to alleviate some of these constraints for high value products, but only at high cost.

3.5. CHANGES IN RELATIVE FACTOR ABUNDANCE PATTERNS

The Heckscher-Ohlin-Samuelson theory of international trade predicts national patterns of production and foreign trade from the international pattern of relative resource abundances. At the most abstract level, these resource endowment patterns can be thought of as the ratios of either the quantities or values of labor and land in potential trading partners. The prediction is that the country with the higher ratio of labor to land will produce relatively more of the good or goods that require larger proportions of labor and will trade some of that good to the other country (in a hypothetical, two-country world) in exchange for some of the other good, which requires a larger proportion of land to

labor. Thus, both countries may produce, for example, both cloth, which requires a higher proportion of labor to land, and food. The country that has the higher ratio of land to labor will produce more food than it desires to consume and less cloth; it will trade its excess food to the other country, which produces more cloth than it desires to consume, but less food. The overall resource availabilities, people's preferences for food and cloth, possibly the distribution of income among consumers within the two countries, and trade restrictions determine the prices of cloth and wheat (actually, their relative price), the prices of the resources used in producing them, the pattern of production in each country, and the pattern of trade between them. Although this simple description of what the Heckscher-Ohlin-Samuelson theory predicts refers to the abstract case of only two countries, two factors of production, and two goods (the "2x2x2 case"), the theory has been found to extend to a wide enough array of multiple country, factor, and goods cases to be considered empirically relevant (Ethier, 1984, pp 178-81). Some important factors from which this theory abstracts are considered in other major theories of trade, which we consider in later sections. These include technological differences among countries and increasing returns to scale, which make relative and absolute country size and certain elements of market structure the bases for trade.

It is far from clear that a nuclear attack would fundamentally alter the bases of trade, particularly if the concept of endowments were restricted to "original" factors--labor and land. Land is difficult to destroy, although more easy to contaminate. The population is more problematic. People can be killed, but populations can regenerate. If society's technological knowledge remains with the survivors, rebuilding of destroyed capital stocks (not original factors of production) can occur relatively quickly. The larger the proportion of the population killed in the attacks, the greater difficulty in retaining the technological knowledge, however. Unless strikes are made deliberately at populations, civilian deaths--although possibly large in strikes at critical production facilities--would be largely collateral and probably would remain at proportions that could be called small relative to total national populations (see FEMA, 1987 for detailed analyses).

From this discussion of original factor endowments, we turn to consideration of produced factors such as capital and other original factors such as nonrenewable natural resources. Capital itself is an aggregate and includes such disparate items as infrastructure (roads, sewer systems, electric power grids, et al.), buildings, machines, and knowledge. Even in an extended period of peace, countries' comparative advantages change as they accumulate these capital items, relative to one another and to the original factors, at differential rates (see Leamer, 1984, for a detailed study of the sources of comparative advantage, and changes in them, for a number of developed countries; and Chenery et al., 1986, for evidence on changing patterns of comparative advantage in developing countries over a twenty-five year period).

Destruction from nuclear strikes certainly could disrupt patterns of comparative advantage composed of ratios of many of these original and

produced factors for periods of several years to possibly a generation or more. Certainly, there is no reason to expect that any two major countries would experience exactly the same pattern of destruction of some ten or fifteen categories of factor endowments, much less that all countries would. Additionally, beginning from initial conditions of destruction, countries could, and probably would, have different recovery rates of individual factors, which would give rise to a different international pattern of relative factor endowments from the pre-disaster pattern. That pattern would evolve over time, as it would have if the disaster had not happened, but probably more erratically.

What are some plausible patterns of interruption to the present American pattern of comparative advantage? Countervalue strikes would eliminate factories: buildings, machinery, possibly some knowledge capital, some populations and possibly some skilled labor, and some associated infrastructure. It is plausible that America's major developed country trading partners would be affected similarly. However, some of the rising industrial nations of the Third World may not be so targeted--Brazil, India, Indonesia, Malaysia, Singapore. Comparative advantage in a number of manufacturing activities might temporarily pass to those countries, but it would be difficult if not impossible to predict which activities, even within fairly broad categories. However, American comparative advantage in agricultural products might increase, particularly if nuclear winter effects were not particularly strong in the northern hemisphere. What nations' new comparative advantages based on relative factor endowments actually were in the post-disaster regime, might take several years to become apparent.

3.5.1. Predicting Postattack Trade from Preattack Trade

Initially, consider applying the simple two-factor concept to the circumstance of the United States after a nuclear attack. If the country suffers direct damage, either labor will suffer greater destruction than the capital stock (including land), the capital stock will suffer disproportionate damage, or they will both suffer about the same extent of destruction so that the postattack capital-labor ratio is about the same as the preattack ratio. Clearly, what the United States is able to trade in an immediate postattack period and during a sustained period of recovery would depend on exactly what was destroyed and what could be repaired, replaced or replenished in a given time period. Less obviously but just as certainly, what the United States would find it profitable to export and import after a nuclear attack would depend on what happened to those ratios of resources in the other countries in the world, because comparative advantage as a basis for trade depends on each country's endowment ratio relative to the endowment ratios of other countries.

One might look at the list of products that the United States currently imports and ask where the United Sates might secure those items after a nuclear war. One possible answer is that the United States might produce, and even export, some of them to countries from which it formerly purchased them. Simply examining preattack supply sources to ascertain postattack American supply sources for manufactured products--

and even some primary products--would be fruitless for the long term, and possibly even in the short term.

3.5.2. Industrial Destruction, Technological Change, and Changes in Trade Patterns

Attacks on American industry and industry of its direct and indirect trading partners would disrupt such activities as iron and steel, aluminum, other primary metals, smelting and fabrication, chemicals, and equipment manufacturers of various types -- electrical, transportation, etc. In the short term, demanders in the United States would turn to overseas manufacturers of those products. If hostilities were still ongoing, as noted above, ocean transport problems could bias foreign trade heavily to Latin American countries if overland or air transport proved practical. If hostilities were ceased, ocean shipping rates would fall to the extent permitted by possible damage to shipping facilities. If Pacific rim industrialized and industrializing countries experienced little or no damage, they would have locational advantages over more distant suppliers like Australia and India.

American industrial efficiency might actually improve over a longer term because of investment in new plants in these industries. Presuming that damage was done primarily to physical capital stocks and not to stocks of knowledge, repairs could be made or new plants could be built fairly quickly. New facilities could embody the latest technology, and the new plants could actually improve the American competitive edge over that provided by the older facilities. Foreign direct investors might be the sources of capital for such industrial rehabilitation, although the government might wish to encourage American overseas borrowing and retention of American ownership of such facilities. In industries in which the United States was the clear technological leader, and in which competitor countries were largely undamaged, such a catch-up opportunity would not exist, and the competitiveness of those industries might suffer relative to other industries.

3.5.3. Population Targeting and Changes in Comparative Advantage

So far, we have considered strategically directed attacks on production facilities, but we cannot rule out the possibility of major strikes at populations. In this section, we explore possible consequences of attacks that kill significant proportions of the national population. The United States is a large country, spatially, and despite the possibility of substantial destruction of capital stocks and labor, the land itself cannot be destroyed, although large parts of it may be contaminated for some time, and weather and climate patterns may be altered at least temporarily.[24] In the time horizon relevant to considerations of long-term recovery, the United States would have higher postattack ratios of land to both labor and capital than it has

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[24]We assume here that the United States will not lose territory to any of its neighbors and that it will retain its political sovereignty.

presently. It is reasonable to suspect that urbanized areas would suffer greater destruction than rural areas in a nuclear attack, and that more urbanized countries would suffer greater relative destruction of capital and labor. The concentration of people in urban areas of the United States is somewhat less than the comparable patterns in Western Europe, somewhat greater than in South America, and substantially greater than in most of the developing countries of Africa and South, Southeast, and East Asia (with the exception of Japan). Consequently, the United States might well be left with a relatively higher postattack ratio of people to land than many of its current industrial trading partners and therefore might find its comparative advantage in space-using activities such as agriculture reduced relative to those countries'. Currently, the major food exporting countries are Argentina, Australia, Canada, and the United States; India has begun exporting food again recently and may be a potential major exporter. The present analysis suggests that "natural" economic forces may keep the United States, and Canada as well, from being as prominent food producers and exporters in a postattack world as might be suspected from their current resource endowment and trade patterns.[25] On the other hand, if the southern hemisphere is relatively untouched in a nuclear exchange, Australia and Argentina may be left with relatively higher people-land ratios than are the United States and Canada. In that event, after land contamination problems were resolved, the United States and Canada might have an increased comparative advantage in agriculture relative to Argentina and Australia. With a high overall population density and a low urbanization rate, India might be eliminated, in an economic rather than a physical sense, as a major food exporter by the changes in relative endowments of agricultural competitor countries regardless of the geographical pattern of nuclear hostilities.

We have included the caveat regarding radioactive contamination of agricultural land, but we stress the importance of that factor for changes in effective relative factor endowments. If land contamination proved to be a stubborn, long-term problem, American agricultural advantages would shrink, and the United States well might become a food importer after the exhaustion of initially undestroyed food stocks.[26] Drastic reduction of American food supplies could raise worldwide food prices substantially, bringing in currently marginal producers. Export of American agricultural technology, possibly through American multinational firms, to relatively unaffected regions could alleviate tight food supplies and high food prices.

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[25]This is referred to as the Rybczynski effect. A change in factor endowments that left the United States with a relatively high ratio of people to land could encourage expansion in U.S. industries that use relatively high people-land ratios and contraction of industries with relatively low people to land ratios. An example of the latter is agriculture.

[26]See Chester and Chester (1976) on land contamination.

It is conceivable that the extensive destruction of labor and capital in urbanized areas could impose a disproportionate loss of skilled labor and impair the United States' ability to train a new generation of scientific and technical personnel and to regenerate a sophisticated capital stock endogenously. This would move the United States' comparative advantage in the long run toward industries that can use less skilled labor and, possibly, simpler capital, unless more sophisticated capital equipment imported from overseas could substitute for less skilled labor.

In a nuclear conflict with such large scale damage, new foreign trade patterns and new patterns of domestic production would evolve simultaneously in reaction to changes in relative resource endowments among countries. This could take a period of several decades to unfold as firms in various countries discover what they can make better and more cheaply than firms in other countries.

3.6. CHANGES IN SCALE-BASED INTERNATIONAL TRADE

As noted above, recent developments in international trade theory have identified increasing returns to trade as a motivation for intra-industry trade, as contrasted to the interindustry trade described by the Heckscher-Ohlin-Samuelson factor proportions theory. In the post-World War II period, a considerable amount of trade in similar manufactured products among industrialized countries has been observed (Grubel and Lloyd, 1975). Integration of the factor proportions theory with ideas about product differentiation in less-than-perfectly competitive industries that enjoy increasing returns to scale has yielded theoretical predictions of the kind of trade in closely related products observed among industrialized countries with similar factor proportions (Helpman and Krugman, 1985, Chapters 7-8).

A nuclear attack would reduce the sizes of markets, both domestically and internationally, depressing the gains to be made from trade based on increasing returns to scale. The variety of manufactured products available to advanced economies would be reduced, and the prices of remaining varieties would increase. Such a reduction in product differentiation could seriously reduce the array of intermediate manufactured products available to sustain production of sophisticated final goods. Full recovery of per capita income (or per capita gross national product) would not restore this production and trade because of the reduction in total income available to sustain the demands for these products and hence to permit former scales of production to be reached. This effect would be more serious, the greater the loss of population.

3.7. INDUCED MIGRATION

Up to this point, the location of surviving "original factors of production" has been assumed to be fixed. However, migration has played a major role in the world economy in the nineteenth and twentieth

centuries and could become more pronounced in a postattack setting. The possibility of drastic reductions in the populations of attacked countries would tend to elevate the wages of the remaining population in those areas relative to wages elsewhere, providing strong incentives for outsiders to migrate either temporarily or permanently to the attacked countries. Given the longer term character of the reduction in populations, there would be strong incentives for permanent migration. Two aspects of this possibility are important enough to warrant further consideration here: (1) emigration from Mexico and Central America to the United States and (2) the possibility of brain drain from the United States.

3.7.1. Immigration from Mexico and Central America

The United States has been concerned with the entry of relatively low-skilled, undocumented workers from Mexico and Central America in the past several decades, but, under certain circumstances after a nuclear attack which left Mexico relatively untouched, they could prove valuable additions to a work force in the United States. If human losses exceeded capital losses after a nuclear attack, the United States might be concerned with having sufficient labor to rebuild its physical infrastructure, and/or to operate existing facilities. These potential immigrants could assist in rebuilding and operation.

The United States may, in such an event, be concerned with the possibility of a large flow of wage remittances out of the country. The retention of immigrants' earnings, or at least the major portion of them, would be an important stimulant to aggregate demand in the United States.

Despite the valuable additions to physical recovery activities the immigrants could make, their presence would have a depressing effect on the elevated American wage rate predicted above. This is an unavoidable and, all things considered, desirable consequence, but it may be resisted politically by domestic labor interests. Retention of immigrants' wage income in the United States could reduce opposition to their presence, however.

3.7.2. Brain Drain

After a nuclear attack in which the United States suffered extensive damage, it is conceivable that the personal opportunities for highly skilled, scientific manpower might be greater elsewhere. Scientific and technical facilities could be in better shape in countries less extensively damaged, incomes could be higher, safety could be greater, and American scientific manpower could be welcome.

Early analyses of the brain drain phenomenon, of scientific manpower migrating from less developed countries to developed countries, where they could earn far more, concluded that the phenomenon probably benefited everybody involved, including the nonmigrating people left behind with fewer scientists in the developing countries. More recent analyses of the subject, however, have re-examined both the observations

on which the analysis has been based and the structure of the analysis itself. Not surprisingly, brain drain has been evaluated in the new analyses as more inimical to the countries of origin than previous analysis concluded. In the newer studies, expectations of higher rewards overseas actually attract larger numbers of students to scientific training in developing countries in the first place. Secondly, much of the earnings of the emigrated scientists is rent, which can be taxed away with no, or even positive, effects on resource allocation. These taxed rents can substitute for foreign aid money contributed to developing countries by the developed. In sum, restrictions on, or taxation of, scientific manpower emigrating from poorer countries to richer ones, can contribute materially to the welfare of the poorer countries (Bhagwati, 1979).

In a post-attack world, the United States might impose emigration restrictions on scientific manpower in the short term, but might want to negotiate tax treaties with countries of potential destination for such emigrants so that the United States accrues some of the rents from the training such emigrants obtained, probably in the United States.

3.8. RECOVERY AND POLICIES AFFECTING FOREIGN TRADE

We use the expression "policies affecting foreign trade" rather than "trade policy" or "commercial policy" because a number of apparently domestic policies can have substantial effects on foreign trade. In particular, what has come to be called "industrial policy" is indirect trade policy and may be more effective in achieving intended goals than direct trade policies themselves. For instance, domestic production subsidies may be preferable to tariffs or import quotas for protection of "critical" industries, and where tariffs can be justified on the grounds of correcting an externality, a direct correction of the externality generally would be superior. Recent work in international economics has pointed to the possibilities of using activist policies to take advantage of opportunities offered by oligopolistic competition to shift profits from foreign countries to the United States (Brander and Spencer, 1981; 1984). On the other hand, successful implementation of many of these types of policy require very good information, much of which is unavailable currently, and could not be expected to be available in a postattack situation (Grossman, 1986, pp 61-62).

A sensible approach to trade policy in a postattack recovery period would be to emphasize simplicity of administrative requirements in addition to the usual criteria of minimizing welfare losses to domestic residents and avoiding retaliations by trading partners. Instituting domestic industrial policies to foster the recovery of manufacturing clearly will be important in the long run; but, in the short run, indirect import restrictions imposed by industrial policies should be weighed very carefully because immediate consumption may be more important to recovery than the rehabilitation of domestic production in a longer time frame.

In agricultural trade, it would not be surprising to see trading partners impose health restrictions on imports of agricultural products from the United States. If this were the case, it would be of dubious value to export units of a commodity which can pass such health requirements and consume at home those units that cannot pass.

It may be considered desirable to restrict the export of particular items that are deemed particularly important to recovery, particularly in the short term. Export restrictions could potentially involve creating an enforcement resource base that would utilize scarce resources. Except in cases in which the exported item would directly and materially assist the enemy if re-exported, and re-export is likely and difficult to prevent, we discourage export restrictions. Judgement about what items are "critical" to recovery would require that the government assemble a considerable amount of information, which would be more efficiently assimilated by markets, possibly assisted by communication facilitation by the government. High domestic prices would ensure that critical items would not be exported. This would be more effective and more efficient than direct controls. An argument could, of course, be made that market or informational failure of one sort or another could render reliance on domestic price signals to indicate domestic criticality of potential exports a theoretical possibility but a practical empty box. In reply, we suggest that a better policy would be to improve domestic price signalling rather than to impose export controls, which would be more difficult to remove later than to impose in the first place.

As noted above, it might be desirable to restrict emigration of scientific personnel from the United States or to negotiate tax treaties to return to the United States some of the rents earned overseas. Repatriation of such rents could be more difficult if such emigrants change citizenship, and taxation could encourage change of citizenship if that were to alter tax eligibility. Consequently, restrictions on long-term movement to foster United States recovery may be more effective than tax schemes, practically speaking, although such personal restrictions should be weighed against long-term implications for general personal and economic freedoms.

In the sections below, we discuss the appropriateness and applications of several devices designed to influence foreign trade under circumstances of conventional and nuclear hostilities.

3.8.1. Restriction of Exports of Critical Items

So-called critical items may take two major forms. First, during hostilities, some items may be considered especially important to the war efforts of the enemy, say certain items of telecommunications technology and specialized metals. Immediate restriction of export of such items is appropriate, but restriction may be more easily imposed than effectively accomplished if experience is any guide. In World War I, British and French firms traded extensively with German firms in items as militarily relevant as artillery shells, cement for reinforced concrete blockhouses, lubricating oil, and airplane fuel through third-country firms (Ferro,

1973, pp 130-132). American and German firms traded similarly during World War II. The presence of American multinational firms in neutral and hostile countries certainly would complicate the enforcement of such restrictions on trade with the enemy in critical war materials.

The second major category of so-called critical commodity, exports of which the government might wish to restrict, are items which are deemed to be in short supply, relative to demand, in the United States during either a period of hostilities or during recovery. Conceptually, this is a much different matter than restriction of exports which would aid the enemy materially. Restriction of this category of critical commodity would depress the price of the item domestically, dampening private incentives to increase supply and would decrease the purchasing power of the United States over other items which it would import. Restriction of American exports could hamper the war or recovery efforts of allies and trading partners by more than American efforts are aided directly by temporarily dampened prices.

Food is a commodity group which could straddle both categories. During a period of hostilities, restricting food imports of hostile countries might be considered as important as restricting their imports of weaponry and closely related industrial materials. Food grains are, and might continue to be, a major American export, and once exported, they are very fungible. It is very difficult to control their mixing with, or replacement by, products from other sources, and consequently it would be very difficult to keep American food grain exports from augmenting enemy food supplies except by military blockade of all enemy imports. The primary option is to restrict American grain exports, but this would be politically difficult, would curtail a major source of American importing power, and could pose difficulties for allies and trading partners.

3.8.2. Maintenance of Domestic Production Levels

One method of defending against interruptions of imported supplies of an item is to maintain American production at desired levels, thus reducing the proportion of the item supplied from foreign sources. This is a course of action that would be initiated during peacetime and is very similar structurally to the import substitution practiced by a number of developing countries. A tariff could be put on imports of the item, a subsidy could be given to American production of the item, or taxes could be applied to American producers (net exporters) of close substitutes. If the United States is a relatively large world consumer of the item in question and can affect world prices, some combination of a tariff and domestic subsidy or tariff and tax would be appropriate (Corden, 1957). Application of a tariff, however, incurs the possibility of foreign retaliation.

3.8.3. Insuring Availability of Critical Imports

Some products, particularly natural resource products, cannot be produced in the United States and have few, or very expensive, man-made

substitutes. Pre-emergency stockpiling is the most common method of insuring supply availability of such items, but stockpiling is a costly method. An alternative is to direct some funds to research into production of substitutes from domestically available materials as well as to maintain some stockpile level.

3.8.4. Protection Against Embargoes

During a period of hostilities and during a period of recovery, the United States might be particularly vulnerable to export embargoes, such as the OPEC oil embargo of 1973-74, from countries with less extensive damage to particular industries. For instance, as the ratio of U.S. imports of some commodity to domestic production increased, the United States could be said to become more vulnerable to extortionary price increases. This type of vulnerability is endogenous, in the sense that the United States can affect the ratio of domestic production to importation that defines the vulnerability. Reduction of such trade vulnerability will be reduced, possibly to an optimal level, by private adjustments, both in production and consumption, to an embargo probability. Unless there are externalities associated with the embargo, neither a tariff nor a production subsidy/consumption tax is needed. Stockpiling may be considered, but for embargoes with low-frequency prospect, stockpiles may raise the price of the commodity to a level not warranted by the embargo prospect. However, the possibility of foreign policy externalities associated with an embargo, which would not be taken into consideration by private producers and consumers, would justify a tariff on imports of the commodity, but not a production subsidy/consumption tax (Tolley and Wilman, 1977). Bhagwati and Srinivasan (1976) recommend a production subsidy/consumption tax in addition to the tariff, but that recommendation is based on an assumption that private producers and consumers will not make pre-embargo adjustments to their behavior.

3.8.5. Protection of Infant or Recovering Industries

A strategic nuclear exchange could destroy some American industries and might even alter patterns of comparative advantage in production. In the former case, American industry might suffer some cost disadvantage relative to lesser-harmed foreign competitors and might be unable to re-establish itself without some form of temporary protection. The usual argument for infant industry protection involves the existence of a costly learning period in the establishment of a new industry, which is a different circumstance than that which recovering industries would face, unless some different processes replaced the older, destroyed ones and they required some learning. At any rate, if some temporary protection for recovering industries is desired, a production subsidy is superior to a protective tariff. Tariff protection gives no incentive to acquire more knowledge, but a subsidy linked to knowledge creation could perform the desired task (Baldwin, 1969; Lucas, 1984).

3.8.6. General Considerations Regarding Tariffs

Tariffs when used for purposes other than to correct distortions have the effect of reducing supply opportunities. In a post-hostility period, when commodity supplies may be a critical issue, tariff increases should be studied carefully for their undesirable, secondary income and employment effects. Additionally, interest group pressures for tariffs may be widespread both in the United States and among its trading partners, and prospects for tariff retaliation and tariff war could be high. The danger of initiating a general trade war should be weighed when tariff increases are considered.

If hostilities have been protracted and trade has been seriously curtailed, domestic prices for many products probably would have floated upward. Resumption of trade during a peacetime recovery period would put downward pressure on prices of many domestically made products that had been largely exempt from foreign competition during hostilities. This increased competition might be an impetus to protectionist lobbies. The government could anticipate such post-protracted hostilities tariff pressure, but should be very wary of granting tariff increases. Temporary production subsidies for certain industries, tied to productivity improvements, would be preferable.

3.8.7. Increased Uncertainty in International Trade

Uncertainty is probably always greater in international trade than in domestic exchange, and a post-nuclear disaster economic environment probably would have even greater uncertainty, ranging from price and production uncertainties to exchange rate uncertainties and heightened political uncertainties. There has been extensive research recently on the impact of uncertainty on international trade and on the effectiveness of various commercial policies (e.g., Helpman and Razin, 1978, 1980; see Pomery, 1984 for a review of that literature). Robust, general conclusions are yet to emerge from that research, but some useful observations still may be made. The equivalence of tariffs and quotas, with no consideration of uncertainty, has long been established, but one of the insights to emerge from the uncertainty research in international trade is that under certain circumstances, one of those commercial policy instruments may be superior to the other. This derives from the fact that the levels of the tariff or quota is determined prior to the revelation of the uncertain events, and once the "state of nature" is revealed, one or the other of them will have been the more efficient instrument (more efficient, e.g., in protecting an import-competing industry). These policies are called state-independent tariffs and quotas; i.e., their levels are chosen before future circumstances (the "state of nature") are revealed and are not adjusted each period in light of what happens (see Helpman and Razin, 1980). State-dependent policies can be devised that are equivalent, but even the theoretical literature observes that they would be difficult to execute and suggests that feasibility considerations may often require the choice of state-independent policy instruments. Although a post-disaster world may face heightened uncertainties, the ability to ascertain just what state of

nature (e.g., a quantity of goods produced or a world price, neither of which could be known with certainty beforehand and may not be known with certainty when those event occur) has occurred could be reduced, and implementation problems would cripple the execution of the policy. Except for the case of insurance, which is strictly state-dependent, state-independent commercial policies probably would be preferable to more flexible ones.

Insurance warrants special attention, however. Risks of conducting business overseas might be especially heightened in a post-disaster world, and that might retard private business activity. Insurance companies might be in particular confusion after a nuclear exchange, both from the possible magnitude of pending claims and uncertainty regarding surviving beneficiaries, as well as from uncertainty regarding the status of their own assets.[27] It is possible that they would not be in a position to continue normal business underwriting activities, much less more risky activity. The government should explore means to provide some forms of commercial insurance coverage to private firms engaged in foreign trade in a post-disaster economy. Reinforcement of private insurance companies might be possible, or some form of publicly-provided insurance supplement may be desirable.

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[27]Although war damages may not be covered in conventional insurance policies, a large and sudden attack on the United States could still cause considerable problems of interpretation regarding many losses.

4. SHORT-TERM FINANCIAL STABILITY

4.1. INTRODUCTION

Financial markets traditionally have been sensitive, even hypersensitive, to news announcements. While physical destruction would be an obvious concern in economic recovery, collapse of the financial integument of the domestic and internacional economy caused by a financial panic could further the economic damage and impede recovery, perhaps for an extended time. The initiation of nuclear hostilities would introduce a number of forces that would encourage financial panic, domestically as a banking panic, internationally in the form of runs on international banks, national treasuries, or both. An initial domestic banking panic could trigger international financial collapse, and international panic could precipitate domestic collapse. Both patterns have occurred, or nearly occurred, in history. Consequently, it is constructive to examine the issue of short-term financial stability in general and previous episodes of instability in particular in a study of issues in American recovery from a nuclear attack.

The first section of this chapter discusses the links between the financial and real sectors of the economy. The second section discusses a number of previous international financial crises and their lessons for U.S. recovery from a nuclear attack. A third section discusses the current status of the international financial system. The final section draws together the lessons for recovery and suggests some policy options that may and may not be appropriate for the circumstances of a U.S. recovery from nuclear attack.

4.2. FINANCIAL EFFECTS ON THE REAL ECONOMY

Issues of the long-run neutrality or non-neutrality of money aside, in the short term, financial variables clearly affect real production. The issue can be posed in a slightly different manner by considering the banking and financial sectors of the economy as another producing sector, like agriculture, chemicals, or wholesaling. The financial sector produces credit intermediation between would-be borrowers and would-be lenders. On the supply side, without the money of lenders, borrowers may be unable to undertake otherwise profitable investments or even routine production efforts. On the demand side, higher-cost credit intermediation asymmetrically raises the cost of borrowing but not the interest rate on saving, unambiguously depressing demands for current goods and services by both firms and households. If the failure of credit intermediation is accompanied by a banking system crash and a concomitant fall in the price level, the insolvency of debtors can take several years to erase, leaving aggregate demand depressed for a protracted period (Bernanke, 1983, p. 260).

In a study of the Great Depression in the United States, for example, Bernanke (1983) found that current and lagged bank failures (bank runs) reduced aggregate industrial production while leaving unchanged the magnitudes and statistical significance of money and price shocks. His findings suggest that nonmonetary effects of the financial crisis exacerbated monetary effects in the short-run determination of aggregate output.

In the ordinary language of macroeconomics, a banking panic and associated collapse of the financial sector involves a very rapid, possibly discontinuous shift, of the LM curve to the left, raising equilibrium interest rates and reducing equilibrium output.[28] Diagrammatically, this is similar to a government reduction of the money supply, but such a shift of the LM curve by a financial collapse entails the destruction of the machinery for subsequent expansion of the money supply. Additionally, the mechanism of financial collapse shifts the IS curve to the left as well because it reduces wealth.[29] Both movements act to reduce aggregate output, although the effects on interest rates tend to offset each other.

4.3. LESSONS FROM PREVIOUS FINANCIAL CRISES

This section describes the causes, consequences, and resolution of six financial crises involving the international economy, going back over the last one hundred and forty years. They are the Gold Standard Crisis of 1847 in the United Kingdom; the Overend-Gurney Crisis of 1866 and the Baring Crisis of 1890, again both in the United Kingdom; the 1914 international financial crisis, centering on London but intimately involving the European and American financial systems; the 1931-35 international financial and trade collapse which saw the entire world trading system nearly cease; and the 1982 developing country debt crisis.

Individually, these episodes illustrate a number of phenomena that are relevant to U.S. recovery from a nuclear attack: connections between domestic supply shocks and international financial problems; links between overseas monetary disorders and domestic financial troubles; the speed with which banking and financial crises develop and spread; mechanisms that have halted banking panics and actions that have exacerbated them; the cost of the lack of intergovernmental coordination and the benefits of coordination; the links between the so-called "veil" of finance and the volume of real trade; and the multiplier effect of foreign trade on national income.

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[28]The LM curve is the locus of combinations of interest rates and national income that are compatible with equilibrium in the money market.

[29]The IS curve is the locus of combinations of interest rates and national income that are compatible with equilibrium in the market for goods and services.

Together, these crises offer several major lessons for external and internal financial policy in the immediate postattack period. First, the international financial system and the international trading system are inextricably linked, and disruption of one will almost always have a disruptive effect on the other without swift, decisive, and appropriate action by monetary authorities. Second, real and monetary events in one country have real and monetary effects in other countries, despite the alleged ability of particular exchange rate systems to seal off individual countries and domestic monetary policies to counteract imported influences. Third, intergovernmental coordination is of utmost importance to ensure that actions that seem sensible when taken separately by individual governments do not counteract one another and leave everyone worse off when undertaken simultaneously or seriatim by all governments. Fourth, financial system failures have real and longlasting consequences.

4.3.1. The Gold Standard Crisis of 1847

A British and Irish harvest failure in 1846 caused an external drain of bullion (foreign exchange) for food imports. This external drain reduced domestic credit. Meanwhile, there was considerable speculation in forward food contracts for delivery in mid-1847 by trading establishments. By the time the contracts matured, a good harvest for 1847 was expected, spot prices for food fell drastically, and many of the traders defaulted. Crises occurred in April and October of 1847. The Bank of England had been sterilizing the bullion drain by lowering its reserve ratio, but sharply reversed its policy in April and sold consols from its portfolio, raising the discount rate sharply.[30] London merchants were thrown into panic as they became unable to get bills discounted. The interest rate increase brought reserves back in from domestic dishoarding and from foreign investment. During the summer, import payments came due again, causing another bullion outflow. In October, commercial failures caused the public to question the soundness of private banks and their attempt to increase liquidity, and a run on private banks put further pressure on the Bank of England. The government reacted by suspending Peel's Act, permitting the issue of notes without gold backing, eliminating the concern for internal convertibility of bank deposits into notes (cash) -- in effect suspending the convertibility of bank deposits into gold. This internal suspension of convertibility left external convertibility untouched. At the same time, the government directed the Bank of England to lend freely at high interest rates, to ease domestic credit and draw bullion in from abroad. The policy was successful, and by the end of the year, the reserve-deposit ratio had risen to roughly its January 1847 level and interest rates had begun to fall.

The suspension of internal convertibility prevented a liquidity problem from becoming an insolvency problem. The Bank of England was prevented from having to liquidate its consol portfolio to get cash. Had

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[30]Consols are undated securities issued by the Bank of England.

it been forced to do so, interest rates would have been forced higher as the price of consols fell, and the Bank's commercial loan portfolio would have deteriorated. Simply raising the discount rate would not have solved the liquidity problem from overseas sources in time to prevent the internal cash drain from breaking the Bank. The suspension was a necessary bridge between the internal run and the accommodation from foreign capital inflows (Dornbusch and Frenkel, 1984a, 1984b).

Several points should be made about this episode. First, real sector events rather than reckless bank management precipitated the crisis. Second, the Bank of England did not act as lender of last resort; in fact, in April, it contracted the money supply by selling consols in its effort to defend the internal convertibility of its note issue. It is plausible that had it lent freely at high rates in April, the October renewal of the crisis would not have occurred. Third, given the course of events, the October suspension of internal convertibility ended the crisis by revising the deposit contract implicit between depositors and banks. The value of deposit withdrawals no longer depended on the timing of withdrawal as it did while the bank run was on: depositors last in line to the withdrawal window would have received less had the bank run resulted in insolvency.

The bank deposit contract is important in maintaining banking system stability in periods of unusual stress. Diamond and Dybvig (1983) demonstrate that adding a provision for suspension to the usual withdrawal provisions of deposit contracts in the event of a bank run can prevent runs and provide optimal risk sharing -- risk of needing cash from deposits earlier than anticipated -- among depositors under certain conditions. In general, however, suspension cannot provide optimal risk sharing, but deposit insurance, without a suspension provision, can, although suspension can improve on uninsured deposits. Additionally, government has an advantage over private firms in providing such deposit insurance. Government can keep a smaller reserve for the insurance because it can collect the tax needed to finance the insurance ex post through inflation. Diamond and Dybvig do not consider moral hazard problems created by deposit insurance, which Kane (1985) concludes are of first-order magnitude and importance in the contemporary federal deposit insurance system in the United States.[31]

There are several points of particular relevance to the issue of U.S. recovery from a nuclear attack. First, it demonstrates the clear links between domestic real supply shocks and international finances under a fractional reserve banking system and the fixed international exchange rates of the gold standard. Second, secondary borrowing to finance arbitrage activities in agricultural commodities boomeranged

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[31]Moral hazard refers to the incentive that certain types of contracts give to a contracting part to reduce his or her efforts below the socially optimal level. For instance, an insurance contract that would replace the full value of lost property would reduce the insured party's incentive to guard his or her property.

because of faulty expectations about subsequent crops, exacerbating the initial international financial problem. This may be particularly relevant when considering how to hedge against the possible second bad crop season in a nuclear winter scenario. Third, the banking panic was fueled by hesitant action (it was initially exacerbated by improper action from a social perspective, as the Bank of England sold consols to maintain its own note convertibility during the midst of a domestic banking crisis). This hesitancy made the end of the panic more difficult. The hesitancy of action by the monetary authorities and the corresponding resilience of the crisis in this episode contrast with the more decisive action and the swifter cure in the 1866 crisis, discussed next. Both episodes highlight the importance of swiftness and deftness of action in nipping a banking crisis in the bud.

4.3.2. The Overend-Gurney Crash of 1866

Overend-Gurney was a highly respected London brokerage house. It had been prominent in debates on monetary policy since 1819 and was respected for its own enforcement of high quality lending and for its advocacy of sound banking policy. In the mid-1850s, it changed management and began making dubious loans. As a financial strategy, it went public in July 1865, and its shares sold for inflated prices. In spring 1866, two large debtors of Overend-Gurney failed, and creditors began to withdraw deposits from Overend-Gurney. The news reached the rest of the money market and Gurney's share prices fell. By May 10, Gurney admitted they could no longer meet their obligations, and they were declared insolvent the same afternoon. Panic over the prospect of being unable to obtain money hit the London market immediately. Gurney's collapse set in motion the failure of a number of firms with which it was associated as well as a run on London banks which threatened to translate itself into a run on the Bank of England. Sound and unsound companies and banks failed. The Bank of England lost 60% of its reserves in one day, but Peel's Act prevented it from augmenting its note supply. The Bank contributed to the panic by hesitating to conduct its normal purchases of government securities. On May 12, the government again suspended Peel's Act, bringing the run to a halt almost immediately. Nevertheless, the London discount market was permanently damaged. A large proportion of country banks took their trade to the Bank of England and did not return to the discount market even when it settled down. Bankers' deposits rose permanently from 30 to 40 percent of Bank of the liabilities of the Bank of England.

In terms of planning for U.S. recovery, this panic warrants attention for several reasons. First, it was a system-wide panic precipitated by events in the financial sector itself. What began as a problem in a single firm spread quickly to all firms in the financial system. Second, it highlights the consequences of uncertainty regarding a central bank's lender of last resort role. The financial houses and banks were uncertain whether the Bank of England would lend freely at high rates or would attempt to protect its note convertibility, and the Bank's initial actions heightened that uncertainty. As Bagehot said of the Bank's actions in the 1866 crisis, "To make large advances in this

faltering way is to incur the evil of making them without obtaining the advantage. . . To lend a great deal, and yet not give the public confidence that you will lend sufficiently and effectually, is the worst of all policies . . ." (Bagehot, 1873, repr. 1902, pp 64-65; cited in Schwartz, 1986, p. 17). In fact, this panic crystallized the Bank's role of lender of last resort, and confidence in its execution of that function. Third, the suspension of note convertibility worked successfully again in restoring confidence in the bank deposit contract.

4.3.3. The Baring Crisis of 1890

Baring Brothers was a leading international merchant bank in London, dating from 1763. During the 1880s it had expanded its investments in Argentina, Uruguay, and Brazil considerably; by 1890, three-quarters of its portfolio was composed of loans to Argentina and Uruguay alone. Its South American debtors suspended payments on their debts to Baring in late spring and summer of 1890, leaving Baring unable to meet its obligations. Baring quietly notified the Bank of England of its situation, and both the bank and the government feared a foreign capital drain if the Baring name evaporated. The Bank raised its discount rate and quietly secured £4.5 million in gold to bolster its reserves against a potential internal and external drain. The government offered to suspend Peel's Act, but the Bank declined, feeling its reserves were sufficient. The Bank also led a quiet rescue operation to guarantee Barings' liabilities for a three-year period, and within a week the rescue fund had reached £17 million. The word of Barings' liquidity leaked out on the eighth day of the rescue operation. Some country banks switched into cash, and the Bank's holdings of country bank bills rose by about twenty percent, but no bank runs ensued. Baring was reorganized as a public (limited liability) company.

The lessons of this episode for present purposes lie primarily in its contrast with the 1866 Overend-Gurney crisis. Schwartz (1986) draws the distinction between real and pseudo financial crises in the two episodes. A real financial crisis in a fractional-reserve banking system involves a scramble for high-powered money and is precipitated by public behavior. It can occur only when institutions do not exist to preclude the development, when the relevant institutions do not understand how to preclude the events, or when the public has reason to doubt the reliability of the arrangements. She distinguishes between the price decline associated with a deflation and that involved in the rapid liquidation of assets in a financial crisis; the former is a result of restricted growth of bank reserves, while the latter is the result of the behavior of the nonbank public exclusively. A pseudo crisis may involve the illiquidity or insolvency of a single firm or several firms, possibly large and prominent, but does not threaten the financial system because the actions of institutions (i.e., government and/or the central bank) protect the system from the fates of individual firms. Both Schwartz and Meltzer (1986) emphasize the importance of stating policies clearly by a lender of last resort to reduce uncertainty about the availability of cash. However, as Moggridge (1986) points out in a comment on Schwartz's paper, the institutional actions which prevented several post-1866

financial stresses from reaching panic proportions were unprecedented and therefore unpredictable (although rational expectations might require modification of the unpredictability of unprecedented actions). To say that the situations were not real financial crises simply because radical actions of the government and central bank prevented panic fails to distinguish adequately between situations of individual firm mismanagement which result in well-deserved failure and situations which, except for institutional action, either pre-announced or innovative, would have resulted in the spread of failure to essentially sound firms.

As Meltzer restates Schwartz's message, the critical distinction is that "insolvency or illiquidity of a bank is neither a necessary nor a sufficient condition for a financial panic. . . [but] . . . failure of the central bank to protect the money stock from a sudden, relatively large decline, unanticipated as to timing or magnitude, is a sufficient condition for a crisis" (1986, pp 32-33). From a policy perspective, public intervention in a pseudo crisis is costly and perpetuates inefficiencies while failure to intervene in a real crisis, possibly because of failure at recognition, may be even more costly. Intervention in a pseudo crisis involves moral hazard problems that are not involved in intervention in real crises. Activating lender of last resort functions for a firm that has been motivated to engage in reckless behavior by advance knowledge of that deposit contract provision is clearly inefficient. This distinction may be splitting hairs, however, because any risk-insuring provision of a deposit contract can induce overextension of risk-taking if it underprices risk, thus leading to a financial crisis if unfortuitous circumstances combine. Thus, Bagehot's recommendation for advance public knowledge of central authority reaction to a financial crisis, noted in the Gurney Crisis, may encourage such a crisis. On the other hand, lending of last resort is lending at high rates on high-quality collateral, and as long as the high-quality collateral requirements are enforced, the moral hazard problem is eliminated or reduced. A firm that has obtained only low-quality loans would have no collateral to offer and could not take advantage of the lender of last resort facility.

In the Overend-Gurney case, reckless management led to the failure of a leading discount house. Because Peel's Act restricted the central bank's ability to expand the money supply, expectations of the unavailability of cash led to a run on private banks which quickly threatened the central bank's reserves and the solvency of a large part of the business community. Halting behavior as a lender of last resort fueled public fears. Suspension of Peel's Act and eventual free lending at high rates on good paper ended the run before the banking system collapsed. In the Baring Crisis, a firm's insolvency was again attributable to poor management, but concern existed that the failure could lead to internal and external reserve drains. The central bank quietly prepared for activating its lender of last resort function, and when the public began converting deposits to cash, the Bank had reserves to lend at high rates, and concerns for cash availability quickly dissipated. According to Schwartz, the Baring Crisis was a pseudo crisis because the widely-accepted belief that the Bank of England would act as

lender of last resort made a run unnecessary for depositors. By her criteria, had the public lacked confidence in the Bank's willingness to act as lender of last resort and a run resulted, the crisis would have been a real one. The bail-out of Barings was inefficient -- acting as lender of last resort to other firms affected by Barings' failure was not.

For purposes of U.S. recovery from nuclear attack, the Baring Crisis demonstrates the importation of foreign monetary and banking problems as well as the possibility that clear understanding of a central bank's role during a stress period may prevent financial distress of a single, important firm from becoming a crisis for the entire financial system. It can be expected in a nuclear exchange that foreign banking systems will experience disruptions which they can export to the United States via American creditors, just as Argentine and Brazilian domestic monetary disorders were the final straws bringing on those government's defaults on debts to Barings in London. While the potential severity for the entire British financial structure of a well-publicized failure of Barings is and was debatable, prompt action by the monetary authority prevented repercussions in the banking system rather than simply halting them after they started. So, once again, promptness is stressed for successful monetary authority action in stabilizing destabilized financial structures.

4.3.4. The Beginning of World War I

After the assassination of the Austrian Archduke Franz Ferdinand on June 29, 1914 in Serbia, the international financial markets in Europe mirrored the increasing political tensions. Tensions in the financial markets, centered in London, reached the crisis point prior to the beginning of hostilities between the major powers and were actually resolved within a few days of Britain's declaration of war against Germany (Seabourne, 1986). In July, internationally traded securities were sold rapidly on all the European stock exchanges, producing erratic fluctuations in foreign exchange rates beyond the gold points. Within a few days, all the European bourses had ceased trading and exchange rate quotations became purely nominal. Remittances of gold for international obligations became impossible. Britain was the major international creditor, and it became clear in the last two weeks of July that foreign debtors would be unable to remit on schedule to the London acceptance houses. The usual channels of remittance all closed down.

First, shipment of goods was too slow to help in the crisis and was further hindered by rising insurance costs and, after the beginning of hostilities, by military action against shipping. Second, gold shipments faced similar difficulties as well as the announcement of gold export embargoes by a number of countries. Third, securities sales and remittance by the issuance of new bills of exchange, formerly the most common means of remittance was eliminated by the closing of the stock exchanges and the unwillingness of London discount houses to grant new credits. Additionally, some foreign debtors temporarily postponed payment under moratoria of their governments. After August 5, debts from

firms in hostile countries had to be written off indefinitely. To add additional burden, all exchange rates except the franc moved in favor of the pound, increasing the real value of the debts. The problems in London caused by this inability to remit were as follows. First, brokers in the London stock market had often borrowed funds to purchase securities for their foreign customers, using the securities as collateral, and most of the money was advanced on margin; i.e., collateral 10% to 20% above the value of the loan had to be maintained. The dive in security prices eroded the margin, prompting banks to either ask for more collateral or call the loan. Selling other securities to meet the banks' requests depressed other security prices. Second, acceptance houses, which had borrowed money from banks to accept bills of exchange could not pay off their loans to banks at their maturity. Third, discount houses downstream from the acceptance houses had borrowed money on call from banks to buy the bills, but could not raise the money. Fourth, another pressure for money came from the public's desire to purchase and hoard nonperishable food and cash at the beginning of a war. These inabilities to fulfil the financial obligations of foreign trade credit threatened to halt all trade credit, foreign and domestic, in Britain, bring down the financial system amid a scramble for cash, force failures of manufacturing as well as financial businesses through illiquidity and insolvency, and generally halt the economy.

When Austria declared war on Serbia on July 28, London banks began calling in loans from the stock exchange and the discount houses. By August 1, the Bank of England had raised its discount rate to 10% (which was largely ineffective since gold could not be remitted from overseas, but was apparently done to permit suspension of Peel's Act), and banks refused to pay out gold. Germany and Russia declared war on August 2, which was a bank holiday in Britain. The government extended the bank holiday three days, issued a partial moratorium on bills of exchange, suspended Peel's Act, and issued £1 and 10s Treasury notes (£5 notes were useless in ordinary transactions). When the banks reopened on August 7, the availability of the small denomination Treasury notes obviated a public run on the banks for gold. By August 8, the discount rate was back down to 5%. The twin problems of getting new bills of exchange accepted and getting them discounted remained, however. Within a week, the Bank of England was authorized to discount any bill accepted before August 4, enabling discount houses to convert bills into money at 5% interest. Three weeks later, the government met the acceptance problem by offering to have the Bank of England lend funds to acceptors to meet their obligations on maturity at 2% above the bank rate. This effectively represented a major infusion of base money into the system, restoring confidence and easing the crisis. Additionally, gold reserves increased by the Bank of England establishing loan facilities in various colonies, overcoming shipping problems. For example, New York was able to remit to London via a Bank of England account in Ottawa. The moratoria on debt repayments in Britain were gradually phased out during the remainder of the year.

The disruption of the international financial market in London hit the New York market very quickly.[32] When London ceased quoting foreign exchange (pound) prices, the supply of pounds dried up. The rate in New York had been $4.8830 (already well beyond the gold export point) at Saturday's close and rose to $4.92 on Monday's opening. New York was already in the normal, mid-summer debtor position in the international short-term loan market and was exporting gold; a $2.5 million shipment had left for London on July 20.

European holders of American securities were scrambling for cash as a result of the disorder in the European financial markets, and the closing of most of the European bourses put especially heavy pressure on sales of American securities. The proceeds of the sales were immediately converted to gold for export, sending the pound to $5.50 and to $6.35 for cable transfers, rates which still did not assure purchases. On Monday, $7 million in gold was exported, $12 million on Tuesday, and another $17 million during the rest of the week. The quick sales required speculative buyers who normally had to borrow for large shares of their purchases. The simultaneous demands for gold withdrawals for the full amounts of the securities sales and loans to let the purchasers carry the securities were tantamount to a run on banks, without offering the operational handles normally available to deal with runs.

The sales were not so large as to be unabsorbable by the American securities market, but the special character of the bear market, with its anticipation of a possible, generalized European war, depressed prices. Cotton futures were especially hard hit during the week of July 27 to 31, and on Friday, three cotton brokerage houses failed and the cotton exchange was closed. The financial damage to the cotton market threatened widespread bankruptcy in the South. The stock exchange also closed indefinitely on Friday, not to reopen until December. The closing of the stock exchange prevented banks from being able to call demand loans to accommodate the cash demands of their regular customers. The entire American financial system was virtually locked up within a week.

The New York Clearing House banks issued clearing house loan certificates, but these were useful only for settling interbank obligations among Clearing House banks. The Aldrich-Vreeland Act of 1908 had permitted qualifying banks to issue bank notes, at declining bank note tax rates, for a period of five years. That act was due to expire on July 1, 1914, but was extended for one year by the Federal Reserve Act of 1913. Banks quickly resorted to these notes, and on August 3, Congress repealed a number of restrictions on the Aldrich-Vreeland notes. Qualifying banks augmented their loans by some $307 million, or 4.08%, by September 12 (contrasting with the inadequate response of 0.64% in the 1907 crisis). The additional circulation was gradually retired by the end of January 1915.

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[32]The following account is taken from Sprague (1915).

The crisis in the United States was attributable to the cessation of acceptances and discounting of foreign bills of exchange in London. The British debt moratoria were of little direct consequence in the United States, but only because the country was in a net international debtor position in the short-term money market at the time. Had the United States been a net creditor at the time, the moratoria would have been of major importance.

This crisis raises important issues for U.S. recovery from nuclear attack. For one, it points to the financial relevance of immediate preattack events to a country's ability to operate its economy successfully in the opening phase of hostilities. Second, it points out a number of events which could be precipitated by war that would impinge directly on the short-term stability of the financial system: the ability to make international remittances via trade or cash transfers could be interrupted or halted by foreign governments' moratoria on debt repayment to save their own financial systems; shut-down of foreign financial systems could impede debt settlements; physical danger to shipping could interrupt the real base of financial instruments; and in the current technological environment, interruption of electronic communications (physical, or even accounting, transfers of gold are less important presently) could prevent current equivalents of gold transfers. Third, it shows how rapidly financial distress can reach crisis proportions, even prior to an age of rapid telecommunication. Fourth, it demonstrates a group of policy actions that halted the crisis within a week and largely reconstructed the financial markets within a month. In the United States, in particular, policy options fortuitously in place before the event proved adequate when used in a proper and timely fashion.

4.3.5. The 1931 Collapse of the International Economy

World War I left the economies of the European countries in disarray, winners and losers alike. The reparations mandated by the Treaty of Versailles threatened to bankrupt Germany, and territorial changes transformed what previously had been domestic activity into international trade. The break-up of Austria-Hungary seriously damaged the financial structure of the major Vienna banks, taking away their most profitable areas of operation and transforming domestic banking activities into international finance (Kindleberger, 1973, pp 148-49; Friedman, 1974, p. 12). Britain's return to the gold standard in 1925 at the pre-war parity seriously overvalued the pound. The franc had been overvalued since 1926, and France's return to gold in 1927 was followed in 1928 by a devaluation of 80% of the pre-war value, leaving the franc even further undervalued (Saint-Etienne, 1984, p. 37). European banks tried to keep bad loans from surfacing by rolling over old loans and extending new credits, seriously reducing their solvency, and central banks papered over the worsening situations by quiet, even secret, rescue operations (Cheng, 1986, pp 14-15). The French undervaluation attracted gold in 1928 through 1931, and the American stock market boom pulled American and European capital from overseas in 1929, just as primary producers were experiencing a downturn (Foreman-Peck, 1983, p. 242). By

1928, France and the United States together held 59% of the world's monetary gold stock while the rest of Europe suffered from illiquidity (Foreman-Peck, 1983, p. 243).

Wartime protective measures were difficult to remove in the 1920's, despite liberalization efforts in 1925 and 1926, and in 1925, a quantum measure of European trade was only 90% of its 1913 level while that of the rest of the world was somewhere between 124% and 140% (Friedman, 1974, p. 15). Britain increased its protection levels after the war, and the tariff negotiations of the mid-20s served only to slow the rate of increase. France followed with restrictive and complicated regulations.

The dam broke in Austria in May 1931 with the failure of the Credit Anstalt Bank. The bank's publication of an international rescue plan set off a run on other Austrian banks. It took the central banks of the United States, Britain, and France three weeks of debate to come up with $14 million credit to the Austrian National Bank, and it was used up in five days. Subsequent negotiations for another $14 million bogged down over French insistence on Austrian abandonment of a proposed customs union with Germany, and after two weeks the Bank of England unilaterally extended the credit, but too late to save Credit Anstalt. The bank runs and capital flight spread to Hungary, Czechoslovakia, Romania, and Poland, which had strong ties to Austrian banks. From there, the panic spread to Germany, which lost almost one-third of its gold and foreign exchange reserve in the first twelve days of June. The central banks of the United States, Britain, and France, together with the Bank for International Settlements, put together a $100 million assistance package in five days, but that lasted only a week.

The Reichsbank asked for further credits, but negotiations among the creditors fared as they did in the second round for Austria, and in mid-July, the Darmstaedter and National Bank (Germany's third largest) failed, triggering a full-scale run on German banks. When the Reichsbank's reserves were nearly exhausted, the government declared a two-day bank holiday and imposed exchange controls. That passed the pressure to Britain, which lost one quarter of its international reserves in the second half of July. On August 1, the Bank of France and the Federal Reserve Bank of New York loaned the Bank of England $250 million, which, as with the Austrian and German loan packages, proved inadequate. Britain went off the gold standard on September 21, and its exchange rate vis-a-vis the franc immediately plummeted.

The British depreciation threatened to offset tariff walls set up by other European countries, but Britain followed up the September devaluation with a series of tariff increases in November and December. Britain substituted imperial tariff preference to negotiated tariff reductions with other European countries in 1932, and the trade war was on. As Friedman (1974, p. 31) describes it:

> By 1935, every country in Europe was using almost every known method of trade restriction: tariffs, quotas, exchange control, devaluation, clearing and payment agreements, licensing of imports, mixing and milling restrictions, and barter. Embargo was even employed in the case of gold movements. The only significant restriction not employed was blockade, a policy which would have to wait for the years just preceding war for its use.

The results for trade were predictable. Between 1928 and 1935, imports fell by 60.8% in France, by 70.6% in Germany, 68.9% in Britain, and 65.2% in the Netherlands (Friedman, 1974, p. 47). A quantum index of world trade fell to a low of 74.6% of 1929 levels in 1932, and a gold dollar value index fell to 34% of 1929 levels in 1934 (Saint-Etienne, 1984, p. 27). Foreman-Peck offers a rough estimate of 3.33 for a world foreign trade income multiplier, using marginal propensities to save of 0.1 and marginal propensities to import of 0.2, both reasonable numbers. World imports declined by $9.6 billion between 1929 and 1933, implying a reduction in world income induced by the reduction in trade of $32 billion by 1933; Britain's GNP in 1929 was $22 billion (Foreman-Peck, 1983, pp 245-46, 259).

The banking troubles eventually spread to the United States. The American banking industry had trouble since late 1930, but the system finally crashed in March 1933, ending in a 6-day banking holiday. President Roosevelt subsequently declared that he considered domestic recovery of higher priority than international economic health, declined to participate in efforts at international financial cooperation or coordination, and devalued the dollar against gold by 59.06% (Friedman and Schwartz, 1963, p. 469).

The world economy continued in disarray until the increase in demand during World War II, and not until the Bretton Woods Agreement of 1944 was there any semblance of international financial order. The beginning of World War II saw little of the flurry of instability and near financial crisis that the approach of World War I precipitated, possibly to a large extent because international economic activity was so heavily controlled as a result of the experiences of the 1930s, rather than lessons learned for economic contingency planning from the previous experience. Adopting flexible exchange rates by going off the gold exchange standard reduced many of the policy conflicts between domestic and external equilibrium, but countries both accidentally and purposively exported employment problems by combinations of devaluations and trade policies which were designed with domestic problems in mind. Policy mistakes were made in addition to the rampant noncooperation, the most prominent to Americans being the Federal Reserve's inexorable reduction of the American money supply, which flattened the American economy and spread to the rest of the world. In fairness to policymakers of the time, the value of economic variables, so clear to subsequent students of the situation, were not always obvious at the time decisions were set in

motion, a lesson which should be remembered under circumstances of a postattack recovery.

This lengthy episode has several lessons for American recovery from a nuclear attack. First, an international financial crisis can spread across countries very rapidly. Second, the attempts to seal off domestic financial crises by sealing off, or otherwise directly controlling, external drains cause as many problems as they solve, if not more. Third, the income effects of trade disruptions can be large. Fourth, and possibly the most important, cooperation and coordination are crucial to the international financial system.

4.4. RECENT SHOCKS AND CURRENT STATUS

There have been a number of bank embarrassments, firm crashes, bail-outs, and liquidations in the past twenty years, but the event posing the only major systemic threat has been the 1982 developing country debt crisis. That episode has not yet been as thoroughly analyzed and intellectually distilled as has the Great Depression, and much of the information on it is scattered, so we review it in less detail than the other events of this section, but we do offer some comparisons with the events of 1931-33. We also review the current prospects for crisis and stability in the international financial world.

4.4.1. The 1982 Developing Country Debt Crisis

Like the Great Depression, the events of 1982 were a long time in developing. The 1973 oil price increases transferred substantial income and wealth across borders and brought the international banking community the tremendous glut of petrodollars to be recycled through the banking system (similar to the recycling of the German World War I reparations payments from Britain and France to the United States and back to Germany in the 1920s). During the 1970s, the share of government claims on GNP increased and economic growth rates declined in the industrialized countries. The industrial countries also began to face more competition from developing country exports, and the tougher times encouraged protectionism. The combination of increased energy prices and the new sources of supply weakened industry in North America and Europe, which responded more in the 1970s by appeal to government assistance and transfers than to technological innovation.

There also has been suspicion that the banking industry was weakened during this time as a result of imprudent investments encouraged by petrodollar recycling. A large share of the lending was from private banks in the industrialized countries to Third World governments. The 1979-80 oil price shock was much stronger than the 1973 increase, and it was followed by efforts at monetary restraint in the industrial countries. The U.S. dollar was strongly revalued in 1981 and 1982, increasing the debt burden of the non-oil-producing developing countries at the same time that demand for their exports was falling in the developed countries. In 1982, the total outstanding debt of the non-oil-

producing developing countries reached $610 billion, and the aggregate debt service ratio reached 24% of the value of goods and services exports, and 54% for the Latin American countries. Circumstances were brought to a head when Mexico, Argentina, and Brazil nearly defaulted simultaneously on their debts in the second half of 1982 (Saint-Etienne, 1984, pp 95-98).

The crisis did not lead to collapse like it did in 1931 because of the existence of a more flexible financial system in which cooperation was forthcoming more rapidly. The U.S. Federal Reserve relaxed its policy of monetary constraint in the second half of 1982 and the first half of 1983, in contrast to its policy in the early 1930s. The Latin American debts were rescheduled by the IMF, with assistance from the United States, in a very timely fashion. Multilateral debt renegotiations involving 27 countries occurred in 1982 and 1983, in marked contrast to the lack of cooperation in the 1930s. Several large American banks faced major problems as a result of imprudent domestic energy and overseas loans in 1982 and 1983 and one was effectively nationalized by the Federal Deposit Insurance Corporation (Continental Illinois Bank), but there was never a run on an industrial country's banking system or even on a single major bank during this period.

4.4.2. Institutional Flexibility

Another great depression cannot be eliminated from consideration, but the greater flexibility of the international financial system in the 1980s in comparison with the 1930s has conferred greater resiliency. First, the gold standard has been replaced by various types of informally managed, floating exchange rates, which allow national policy makers more leeway in balancing domestic and external concerns. The flexible rates are not costless, however, and many concerns are voiced about the consequences of exchange rate uncertainty on interest rates and tradable goods prices. Second, deposit insurance is a widely installed feature in domestic banking systems, although the moral hazard problems associated with it have been noted, and its effectiveness is dependent on interpretations and enforcement of bank regulators. Third, the International Monetary Fund and the Bank for International Settlements are more effective organizations for promoting international monetary cooperation and for acting as restricted lenders of last resort to governments than anything that existed in the 1930s. Fourth, private international capital markets are more complex, offering a wider array of financial instruments and greater world liquidity through the eurocurrency markets. The eurocurrency markets' role in providing liquidity is a mixed blessing, however, since they are largely uncontrolled, have quite variable deposit-money multipliers, the deposits are often uninsured, and offshore banks, which many eurobanks are, have limited ability to go to host governments for lender of last resort facilities (Cohen, 1981; Meltzer, 1986).

4.5. LESSONS FOR U.S. RECOVERY

Collapse of the international financial system could be expected to have substantial and persistent real effects on the world economy. Income reduction in American trading partners will reduce income in the United States as well. This section has described what happened in four near misses and one fully accomplished collapse in an effort to show the range of policies that have averted international financial collapse or domestic financial collapse in crises involving international events. Despite the differences in circumstances over the period covering these crises and the late twentieth century, some important lessons can be drawn.

The success of policies in averting financial collapse has derived essentially from eliminating public concerns about liquidity. Suspension has worked, because it tells depositors that, in a situation in which a first-come-first-served policy could not serve all demanders, nobody can have any and therefore everybody is safe from the potential depredations of his neighbor in line ahead of him. Lending of last resort accomplishes the same end by showing depositors that all that is demanded can be had, although private banks pay a premium for using this privilege in the form of higher interest rates on the funds to back their deposits. Deposit insurance attempts to short-circuit the crisis by giving confidence beforehand that liquidity will not be a problem.

What particular problems would the use of these three liquidity- and confidence-preserving devices face in the circumstances of recovery from a nuclear attack? The lender of last resort facility has proven very useful when used early and decisively, but its use relies on the existence of high-quality bank assets for collateral, and a nuclear attack might very well leave considerable doubt about the real assets underpinning financial assets. Additionally, if physical elements of the banking system suffer destruction, the quality of existing assets may suffer or at least be questionable because of the lack of interbank connections. By the time these questions are answered satisfactorily, the time for successful lending of last resort probably would have passed.

Deposit insurance would not suffer from the timeliness-of-execution problem that last resort lending would. However, although deposit insurance could assure liquidity of deposits, the financial payments system still would face the problem of other destroyed assets in both bank and nonbank financial institutions. If the stock market is unable to function because of destruction of real and/or paper assets, bank loans could not be repaid on time, even if they later proved to be good loans. The 1914 crisis suggests that a very quick government moratorium on certain categories of (or possibly all) loan repayments, with concomitant agreement by bank regulators to not treat such loans as defaulted, could lend the required confidence to the financial system. In a well-integrated world economy, however, suspension of foreign loan repayments can impose capital losses and banking panic on trading partners, as occurred in 1914, as well as in the German payment

suspension of 1931. Such a domestic loan moratorium would have to be coordinated internationally, presumably as a standing contingency rather than something that would have to be worked out in the initial phases of a nuclear war, when other priorities probably would take precedence. This implies that some combination of deposit insurance and suspension of both deposit convertibility and of loan repayments, with international coordination of suspensions, would be necessary to forestall financial panic and crash. Whether that would be sufficient requires further investigation.

The credibility of deposit insurance would be of first-order importance. In the recent experience of state-insured savings and loan institutions (S&Ls) in Ohio and Maryland, runs were limited to institutions not federally insured. In Ohio in March 1985, the Ohio Depository Guarantee Fund (ODGF), a private deposit insurance fund, ran out of reserves, and the run on S&Ls insured by the ODGF continued while federally-insured S&Ls were untouched. In Maryland, the pattern repeated itself in May 1985: privately insured S&Ls experienced runs despite their deposit insurance while neighboring federally insured S&Ls were untouched (Gilbert and Wood 1986, pp 12-13). If the Federal Deposit Insurance Corporation were to appear bankrupt because of the volume of deposits of failed institutions, collapse could be averted only by very rapid action of Congress to extend its reserves or otherwise extend the guarantee of deposits. Again, the crisis atmosphere might prevent timely legislative action to resolve the problem, but some other emergency extension provision might be able to provide a contingency substitute.

5. THE INTERNATIONAL ECONOMY AND THE DOMESTIC MACROECONOMY IN RECOVERY

5.1. INTRODUCTION

The stability of employment and aggregate production and income are of concern to the government during peacetime, and those concerns naturally would extend to wartime and post nuclear war recovery periods. In the past fifteen or twenty years, the openness of national economies to international influences has been growing, and macroeconomic theory has followed this empirical trend. The first few generations of Keynesian macroeconomic models permitted foreign influences to operate on the domestic economy only through the trade balance, and this conception of international influences on aggregate economic behavior has become inadequate as international capital mobility and the ratios of trade to national production have increased (Kenen, 1985). Research in this field is very active and many specific results are sensitive to model specifications, but a number of important issues in domestic economic sensitivity to international interactions are widely agreed upon. Rather than try to make predictions about what would happen to, say, aggregate employment in response to an American fiscal injection under floating exchange rates, the section identifies some areas in which the results of traditional policy actions could be heavily influenced by the characteristics of international linkages.

However, we begin the discussion with a consideration of the role of the dollar in a postattack world. Simply posed, the question is, "Would the U.S. dollar continue to be a major international currency, or could it virtually cease to exist in international transactions?" This is an issue of concern even in peacetime and certainly is a reasonable question to pose regarding a period in which extensive physical destruction occurs in the United States.

5.2. THE ROLE OF THE U.S. DOLLAR IN A POSTATTACK WORLD

Sterling was the major international, "vehicle" currency during the period of the gold standard until World War I. After World War I, it was joined by the American dollar, and after World War II it was largely replaced by the dollar. During this period, the relative size of the British economy in the world economy shrank considerably, and its share of actual international transactions shrank even more. It is not inconceivable that similar changes in the U.S. economy could influence the international use of the dollar similarly.

Theory is relatively informal regarding the choice of an international vehicle currency, but what there is says that the share of international transactions occurring in a given country's currency is a major determinant of international vehicle currency choice, but that once a vehicle currency has been chosen, economies of scale arise. Transactions not directly involving the use of the vehicle currency often

will use the vehicle currency to purchase both transacting currencies rather than purchasing directly because the respective vehicle currency-third currency markets are bigger and hence more stable than a much smaller market in the two third currencies. Transactions involving manufactured goods have a propensity to be denominated in the currency of the exporting country. Relatively standardized, primary and raw material exports tend to be denominated in a vehicle currency, presently the U.S. dollar. The relative volume of American transactions in manufactured goods influences the choice of the dollar as a vehicle currency, but the choice of the dollar as the vehicle for the primary products is more arbitrary and follows the choice of the dollar as the vehicle currency for manufactured goods. Inertia follows the rise of scale economies, leaving the vehicle currency with advantages for international transactions even in the presence of eroded relative trade volumes, such as the United Kingdom experienced after World War I

While the theory of the emergence and continuation of a major international vehicle currency has been relatively informal, there has been more detailed modeling of the choice of the invoice currency for international transactions. Bilson (1983) studies the problem as one of market power between importer and exporter, exchange and production risks, risk aversion, and hedging. While simple predictions of invoice currency choice are not forthcoming, some relevant considerations for the circumstances of recovery from a nuclear attack emerge.

Exchange rate fluctuations pose greater risks than either production cost or selling price variations do. The majority of international commodity trade is contractual, with an average contract length of around six months, which reduces selling price risk (Magee, 1973). Production costs also are largely covered by contracts, leaving exchange rate variation the major source of risk in international transactions. However, the covariances between the exchange rate and the selling price and between the exchange rate and production costs are important. Importers realize their uncertain costs at the end of the transaction, and they usually have considerable leeway in adjusting the sale price and the timing of the payment; but the exporter incurs costs at the beginning of the production process, and those costs are not likely to be influenced by subsequent exchange rate fluctuations. This difference in timing of risk encourages invoicing in the exporter's currency. However, more unpredictable inflation in, say, the exporter's country would encourage invoicing in the importer's currency. If important inputs to production in the exporting country are denominated in the importing country's currency, the exporter is also more likely to invoice in the importer's currency to avoid exchange risk. Greater market power on the part of the seller can result in either a higher total price paid by the importer or invoicing in the exporter's currency, depending on the relative risk aversions of the importer and the exporter.

Fixed exchange rates encourage the dominance of a single vehicle currency, whereas flexible rates encourage portfolio diversification among several major currencies, such as the dollar, Deutsche mark and yen presently. Additionally, fewer controls associated with a national

currency make it a better choice as a vehicle. Thus, at the present time, the volume of yen transactions relative to dollar transactions, by itself, would suggest that larger use of the yen in vehicle uses, such as reserve holdings, but the greater controls associated with the yen depress the extent of its vehicle use far below the dollars's--although controls on the yen have been relaxed.

If the dollar were supplanted by another currency as the international vehicle currency, many assets could simply be redenominated in the new currency, and little problem would be caused. However, financial intermediaries could be exposed to increased exchange risk. International banks borrow short and lend long, mostly in dollars, and a transition from dollars to some other currency would force some transition period in which borrowing and lending were in different currencies, posing stability problems if the dollar depreciated sharply against the new currency (Krugman, 1984, p. 277). As Krugman notes, Britain made the transition, but that should not be cause for excessive complacency.

In the event of a nuclear conflict, most of the countries whose currencies currently are competitors for the dollar as vehicle currencies probably would be combatants, and it cannot be stated with certainty whether they would suffer greater damage than the United States. So a priori, there is no presumption that any particular currency would be a haven for former dollar holders. Besides, many dollar-denominated assets are held simply as account entries all over the world, and the combination of such dispersal and cheap physical replaceability might protect the dollar's role as a vehicle currency in the event of a nuclear attack. If, however, one major industrial country distant from combatant countries escaped involvement (Japan, for example), its currency might--but not necessarily would--be a candidate to replace the dollar as the major vehicle currency in a multiple vehicle currency system.

However, if flexible exchange rates were retained and exchange rates showed high volatility after an attack, other currencies would be substituted against the dollar, even if their exchange rates vis-a-vis other currencies were no less volatile, simply as a portfolio diversification measure. A multiple vehicle currency system probably would emerge, with an important role for the dollar.

A more stable rate of inflation in the United States than in other countries would promote the invoicing of trade with the United States in the dollar, and might even encourage the use of the dollar in manufactures trade not directly involving the United States.

Suppose that the United States were faced with capital flight after a nuclear attack and that the government decided to impose capital controls to protect the dollar. If the capital controls remained in effect for some time, other currencies that were subject to fewer restrictions might be substituted for the dollar as vehicle currencies, thus ultimately weakening the dollar, possibly more than a period of capital flight would have done in the first place. Of course, if capital

flight did occur, it is not obvious that it would be leaving the United States rather than entering it. A very likely event would be capital flight from Europe to the United States and possibly some of the Asian rim countries in a period of escalating tension prior to the outbreak of hostilities in Europe and during the opening phases of a conventional war in Europe, possibly before any nuclear

5.3. INTERNATIONAL LINKAGES AND DOMESTIC MACROECONOMIC PERFORMANCE

So far we have discussed issues of commercial policy regarding real trade (Chapter 3) and very immediate issues involved in avoiding collapse of the international financial system (Chapter 4). The government undoubtedly will be concerned with the aggregate performance of the surviving U.S. economy during a sustained period of recovery. It will want, among other things, to maintain a high rate of employment, encourage savings and investment to foster a high rate of economic growth, maintain a stable price level, and generally avoid aggregate instability.

Macroeconomic theory, or national income and employment theory as it is sometimes called, as it developed from the 1930s into the 1960s, dealt almost exclusively with the domestic economy. Foreign influences exogenously entered the domestic economy through the foreign trade account. The high international mobility of capital in the period prior to World War I came to a nearly total halt with the trade wars of the 1930s, and continued to be highly controlled into the 1960s, particularly in Europe, although the United States was not exempt either. In the United States in the later 1960s, capital movements were controlled in response to the American balance of payments deficit. Consequently, macroeconomics paid little direct attention to the capital account, particularly internationally, because it was relatively inactive. But by the early 1970s, greater international capital flows and the return to a flexible exchange rate system brought more obvious international influences into the domestic economy and macroeconomic theory has responded by dealing with international influences on a domestic aggregate economy in more sophisticated ways than through simple trade flows. Relatively recent beliefs that flexible exchange rates could largely insulate national economies from monetary events abroad and give domestic policy makers greater flexibility to pursue independent policies at home have been replaced with recognition that flexible rates confer much less latitude on domestic policy than previously believed, not a whole lot more, in fact, than fixed rates offered (Kenen, 1985, pp 670-71).

As noted in the introduction to this chapter, the recent literature on international macroeconomics is vast, the model specifications are diverse, and many theoretical predictions are correspondingly sensitive to model structures. The behavior of exchange rates is a central phenomenon to this literature since they represent the point of pricing contact between national economies, and scholars devoting their research efforts to that subject currently are dissatisfied with both the

predictive and explanatory power of the empirical implementations of their theories (Meese and Rogoff, 1983). They point at least as much of their criticism for these shortcomings at their theoretical structures as at their statistical tests (Mussa, 1985; Frankel; 1985, Kouri, 1985). Thus, while there is wide agreement that international influences on domestic macro economies are many and possibly powerful, understanding of the exact mechanisms is still evolving.

Consequently, we make no attempt to enumerate predictions, but limit the subject to a discussion of international linkages among the domestic macro economies of separate nations.

5.3.1. The Capital Account

With international capital mobility, changes in foreign demands for financial instruments quickly affect a home country's capital market. If foreign and domestic assets are not perfect substitutes, and generally they are not, then it is possible that an increase in foreign interest rates could lead to a long-run decrease in the home interest rate, although an increase is more likely (Kouri, 1983). Events in foreign asset markets can affect employment at home by changing interest rates and domestic and foreign consumption. An increase in foreign interest rates will draw capital from the home country, decreasing the demand for the home currency. Under flexible exchange rates, the home currency will depreciate unless a compensatory tightening of domestic credit is accomplished, while under fixed rates there would be a reserve outflow.

In a postattack recovery period, interest rates would be likely to rise in the domestic capital markets of combatant countries in proportion to the physical damage they experienced, at least up to some point. It is obvious that international capital mobility would quickly spread these interest rate increases to other countries. However, sealing off capital flows would not necessarily seal off other countries which did not want their interest rates to rise. Other countries can still increase their holdings of the currency of the country with the higher interest rate, strengthening the exchange rate for that country's currency and either forcing increases in the other countries' interest rates or forcing those other countries into unwanted credit expansions which, in turn, could lead to other undesired results.

The larger the country initiating the change in its capital market, the greater the international transmission. If the United States were to experience substantially more damage relative to its trading partners, so that its relative size were reduced, it would be more subject to such shocks from overseas.

A real possibility, noted in the first section of this chapter, is that the heightening of tensions prior to a nuclear outbreak, or in the opening phases of a conventional war, might precipitate a flight of capital out of Europe and into the United States and some of the Pacific rim countries. As the physical capital stocks underlying European stocks and bonds became threatened, holders of those assets might well attempt

to shift into claims on assets less immediately threatened. The immediate consequence would be a drain on the dollar and a skyrocketing of American interest rates that could hurt American employment and production. Rather than seeing this as an opportunity to buy European, domestic monetary authorities might want to consider loosening domestic credit. On the other hand, the Eurodollar market might be able to supply much of the credit without direct intervention by American authorities.

5.3.2. Monetary and Fiscal Policy

Results of traditional theory regarding the effectiveness of monetary and fiscal policy, with and without capital mobility, under fixed and floating exchange rates, have been well defined. With perfect capital mobility, domestic monetary policy was believed to be ineffective in altering real national output under fixed exchange rates, but fiscal policy was thought to be effective; and vice versa under flexible rates. With capital immobility, the domestic effectiveness of fiscal policy increases with flexible rates. However, with imperfect substitutability of foreign and domestic financial claims and domestic willingness to sterilize payments imbalances, monetary policy can be effective. With greater attention paid to the role of the exchange rate in money market equilibrium, more recent work indicates that fiscal policy can be effective under flexible rates (Branson and Buiter, 1983).

Domestic monetary policy will induce asset portfolio reshuffling which includes foreign-denominated assets and foreign exchange. The reverse chain of events also operates: a change in the exchange rate of a major currency or currencies will induce domestic portfolio adjustments which can leave the combination of domestic financial claims and money incompatible with domestic interest rates, leaving in turn the domestic monetary authority with adjustments to perform.

All these results imply that domestic monetary and fiscal policies will be at least partially transmitted abroad, and, again, large economies will transmit more palpable effects abroad than small economies. In a postattack world in which government fiscal policies are especially active, say, in physical reconstruction and compensation, countries could receive a considerable number of external shocks from the domestic operations of other governments as well as domestic demand and supply shocks in other countries.

5.3.3. The Importance of Exchange Rates

One of the important developments of the international monetary research of the 1970s was the recognition that foreign exchange rates are asset prices rather than simply the relative prices of national currencies. The dollar is an asset held in many portfolios, both in the United States and overseas; when exchange rates--and not necessarily only dollar rates--change, portfolio balance requirements induce re-arrangements of dollar holdings around the world, including domestically.

Exchange rates also act in pricing international exchanges in real goods and services. Frequent, large changes in exchange rates, or postponed changes in exchange rates under a fixed rate system, work backwards into production decisions and can cause efficiency losses (Machlup, 1955, pp 265-67).

After a decade and a half with a floating exchange rate system, a number of economists, businessmen, and politicians are becoming nostalgic for a return to a fixed rate system of some kind. Such a system might gain considerable appeal under the potentially disorderly circumstances to be found during recovery from a nuclear war. Fixed rates might, indeed, impose much-wanted order on international prices. The only problem with the return to a fixed rate system, particularly in a post-attack situation, would be getting the exchange rates right. It should be recalled that both Britain and France valued their currencies at incorrect gold prices in their return to the gold standard in the 1920s. Britain got its rate too high and suffered high unemployment and inflation; while France got its rate too low, resulting in inflation. The valuation resulted in an outflow of gold from Britain to the extent that Britain left the gold standard again in 1931--this time forever. Both errors materially aided in sending the world economy into its international tailspin of the 1930s. And both countries had better information available on domestic prices than the world could expect after a nuclear conflict. A floating rate system, on the other hand, actually might assist in restoring information on both international and domestic prices during recovery in a postattack world.

6. THE MULTINATIONAL ENTERPRISE

6.1. INTRODUCTION

This section discusses several aspects and characteristics of multinational enterprises (MNEs) that are relevant to the subject to the United States' recovery from a nuclear attack. A complete discussion of the MNE is beyond the scope of the present report. The most comprehensive recent review of theories about and evidence regarding the MNE is Caves (1982). This section identifies three topics involving the MNE that warrant consideration in a discussion of recovery from nuclear attack. First, however, we introduce what is meant by multinational enterprise. In the next section we discuss several reasons for multinationalization of business involving phenomena that may be subject to change or revaluation in a post-attack situation. In the following section, we discuss the role of the MNE in securing access to raw materials. Following that, we explore the diversification effects of multinationalization. A concluding section recommends some policies regarding the MNE in a post-attack world.

6.2. DEFINING MULTINATIONAL ENTERPRISE

A multinational enterprise is a business that has direct, managing interests in operations in more than one country. For instance, a company may produce in country A, its home country, and own and operate its own distribution network in country B as well as country A. The firm exports its product or products to its distribution affiliate in country B, which sells the products in that country. Part or all of the profits from the sales in country B are repatriated to the parent firm in country A. Since the foreign affiliate is only a sales firm in that scenario, some students of the MNE would not consider this example a true case of multinational enterprise. A more popularly conceived multinational scenario, and one which meets everyone's definition of multinational enterprise, is one in which a parent firm A in the home country undertakes R&D and production while a foreign affiliate in country B undertakes production for the country B market. The parent firm and the affiliate may produce identical products, with the R&D governing the production conducted exclusively in the home country and the affiliate in country B paying service fees for the use of the R&D products. Alternatively, the parent firm may export products to the affiliate in country B for assembly and sale in country B, or possibly for re-export to the home country. A further alternative is the reverse case, in which the affiliate produces some first-stage product which it exports to the parent company, which may subject that product to some further processing before sale to final consumers in the home country. There is a nearly endless sequence of possible interactions among parent companies and foreign affiliates, involving R&D, intermediate and final production of goods, production of services, distribution and sales, and export of

intermediate and/or final products between the parent and the affiliates, with various degrees of autonomy among the affiliates.

A distinguishing feature of the multinationalization of this business activity is that the firm's investment in country B is a foreign direct investment (FDI) which confers managerial authority, in contrast to a portfolio investment in a foreign country. The parent firm need not own the entire stock of the affiliate in country B, and in fact need not even own a controlling interest in the equity of the foreign affiliate. Countries differ in the minimum percent of equity ownership required to move a foreign investment from the portfolio investment category to direct investment.

In all but the very first of these scenarios, the direct investment overseas is an alternative to direct trade in goods and/or services. The interesting resource allocation issues regarding the MNE, and the issues important for post-attack recovery considerations, turn around the multifaceted trade-investment choice. The choice of whether to trade or invest overseas has its roots in the prior bases for trade. The foreign direct investment decision is really a decision of how much to invest rather than a simple either-or choice. And although foreign direct investment is an alternative to trade, the two may be either substitutes or complements, or possibly neutral in that regard. In other words, foreign direct investment may simply place production overseas that otherwise would have taken place in the home country, reducing employment at home and increasing it overseas. This possibility is frequently raised by representatives of labor in home countries, but not by their representatives in recipient countries. Representatives of capital in recipient countries sometimes object to foreign direct investment because the additional capital may depress the returns to local capital, although the amounts involved are usually too small to have such discernible effects; their grounds for complaint are usually less direct, appealing, say, to the possibility of "control" of the local economy passing to foreign hands. A thorough discussion and examination of these issues is contained in Bergsten, Horst and Moran (1978). Alternatively, foreign direct investment may actually increase trade beyond what would have occurred in the absence of the foreign investments.

FDI need not directly affect trade to affect employment either at home or in the recipient country. In the recipient country, it is possible that the foreign firm simply displaces local production, with no net effect on employment, but with an increase in efficiency, the rewards of which may, but need not necessarily, be repatriated to the home country. In the home country, the FDI may displace local production or it may simply represent production that could not have survived competitively at home; if the latter is the case, the increased income generated by the increased world employment can have the secondary effect of inducing additional production and employment at home.

This discussion lays out reasons why separate treatment of the multinational enterprise is relevant for assessment of post-attack recovery possibilities. First, the MNE can affect employment in the home

country, both directly and indirectly. An alternative view of the MNE's effects is that it can alter the volume and/or composition of production and consumption, directly or through induced income effects, from what would occur only through trade. Finally, in a disrupted world economy in which trade flows are erratic and uncertain, MNEs may affect the stability of domestic employment and consumption. The rest of this chapter discusses how the MNE currently is believed to operate in order to assess how the MNE might react to the shocks brought by a nuclear attack and how the recovery of the United States economy might be affected by their reactions. We stress the current understanding of the MNE because that area of theory is rapidly evolving; we stress how the economy might react because the theory emphasizes that the MNE's effects on home and host economies are contingent on a number of considerations. Despite these caveats, however, we are able to point to some definite issues that will have importance for U.S. recovery and with which U.S. policy makers should be concerned.

6.3. REASONS FOR MULTINATIONALIZATION

Much of the theory on the MNE attempts to explain why firms operate across countries, or why multinationals exist. Most of the explanations offered are non-exclusive, which vastly complicates the subject. These explanations include efforts to get around national trade and tax policies, efforts to reduce exchange rate risks, internalization of transactions that are difficult to conduct in arms-length market exchanges, firm strategic behavior in imperfectly competitive markets, administrative economies of scale in large firms, and least cost production under conditions of differential international input mobility and availability and imperfectly competitive markets. Each of these categories of explanation includes many separate contributions to the theory of multinational enterprise which emphasize different phenomena. A number of these explanations have been packaged together in what Dunning has called the eclectic or OLI (ownership advantages, location advantages, and internalization) theory (Dunning, 1977, 1981) and which can be considered the principal paradigm for the study of MNEs currently. A number of Marxist theories regarding MNEs exist, but the issues they raise are generally subsumed under the mainstream neoclassical theorization (Cohen, 1973). The OLI paradigm is a handy device for thinking about the character of individual motives for multinationalization, but a number of the individual motives cut across that classification. In the following section, we concentrate on the individual motivations. Also, we make no attempt to offer a complete review of theories of the MNE, but refer to ideas that appear particularly important for the present purpose, which sometimes include elements of several theories and cut across the OLI classification scheme. We focus on three issues in the motivation for multinationalization: firm integration and internalization of markets, resource endowment incentives for multinational production, and national trade and tax policy inducements.

6.3.1. Firm Integration and Internalization of Markets

Several of the motivations for multinationalization involve the establishment of broad information systems that cross international borders. A MNE can transmit information among its branches through a variety of price and nonprice mechanisms. These mechanisms may become relatively much cheaper and more reliable than market price signals in the event of monetary disorder following a nuclear attack. If general information and the information content of prices become scarcer after an attack, it may make sense to facilitate mergers, national as well as multinational. We review some of these integration and internalization activities that involve the economic use of information.

The multinational expansion of activities includes both vertical and horizontal integration of activities. Vertical integration, e.g., mining, smelting, refining, and manufacturing, has been recognized for some time as assisting a firm achieve economies of scale in production. However, horizontal integration across activities that are neither up- or downstream from one another can contribute to the attainment of important scale economies in administration which involve production and transmission of information. Desire to achieve either type of scale economy can lead to multinationalization, but the administrative economies of scale that may be attained with horizontal integration warrant attention here since they are easier to overlook than scale economies in commodity production.

Additionally, in the production of many non-standardized products, including services such as R&D, exchange via arms-length markets such as licensing agreements, can compromise trade secrets or otherwise fail to appropriate the full value of rents to a firm's specialized capital. In such circumstances, the horizontal as well as the vertical expansion to a foreign affiliate can transform an arms-length transaction to an internal one in which the parent firm controls the terms and pricing of the service or product transfer and consequently can appropriate the full value of rents and avoid any undesired and unintended transfer of technology. What would involve a market failure in an arms-length market can be transformed into an optimal allocation -- <u>from the viewpoint of the firm, not necessarily socially</u> -- by the internalization of the exchange facilitated by the integration.

The internalization of markets for products and services among the branches of a single, multinational firm involves what is known as transfer pricing. When a highly differentiated product is exchanged between two branches of the same firm, no external market is used to determine a market price for it, although a referent market price may be available if the product is also sold outside the firm. The firm has a considerable amount of discretion in the accounting price charged for the product by the selling branch of the firm and consequently can adjust the price to minimize the total tax payments of the firm in several countries.

Governments try to police this discretion to avoid losing tax revenue, but the extent of their success is little known. The ability to manipulate transfer prices considerably complicates the firm's internal resource allocation environment because optimality generally will require pricing intrafirm transfers at marginal resource costs, i.e., the price that would be charged to outsiders under competitive conditions, but in a tax-distorted environment, profit maximization may call for systematic exception to the first-best rule within the firm. As a result, different national tax policies may induce distortions in resource allocation within large, multinational firms.

The lesson of present relevance, however, is that multinationals routinely establish internal accounting prices that make internal economic sense, if they do not always reflect external marginal social costs. These transfer prices therefore may be useful as a price signalling conduit in post-attack circumstances of unreliable market price signals, although care must be taken in relying on multinationals in such a role. Trade and tax policies that give distortionary incentives to multinationals should be eschewed whenever possible, and rough compatibility of such policies across countries in which the multinationals operate should be encouraged. Physical destruction of facilities and the partial reliance of multinationals themselves on potentially unreliable local prices in the establishment of internal transfer prices may pose practical problems to MNEs in the determination of transfer prices after an attack, but their knowledge of how to determine and administer rational internal prices probably will remain largely intact.

The administrative capital that multinational enterprises have built up to compensate for informational as well as other kinds of market failures may prove to be a valuable and robust resource in a post-attack environment. In the peacetime world of the post-World War II era, the administrative resource allocation systems set up by MNEs have used, in addition to their proprietary, internal information, reasonably reliable external information -- prices, etc. -- and this undoubtedly would change in a post-attack situation. However, the efficient, internalized information processing and transfer systems with some erratic external information may be a superior price signalling system than public markets with serious information disturbances.

6.3.2. Resource Endowments and Multinationalization

The most sophisticated theories of international trade presently available have their roots in Heckscher-Ohlin trade theory, which relies on national resource endowments to predict international and industrial production and trade patterns. The Heckscher-Ohlin model, and its theoretical progeny are general equilibrium models, as contrasted with partial equilibrium models. That is, they work with circular flows of income in national economies and the world, so that payments to factors of production (e.g., wages to labor, rentals to land, etc.) are determined by production patterns which, in turn are determined by demands, national resource endowment patterns, and technology; but demand

is influenced by incomes, which are nothing but payments to factors of production, so that supplies created by production determine the pattern of demand, which in turn is a major influence on the pattern of production. Until recently, most thinking about the multinational enterprise has been of a partial equilibrium nature, strongly influenced by industrial organization theory on the one hand and portfolio theory on the other. This thinking, which is often highly sophisticated in its own right, does not incorporate the links between production, or supply, and demand, but rather presents the economic actors in its theories with given demand curves and studies production and organizational responses. In this partial equilibrium context, considerable sophistication has developed regarding the firm and industrial behavior of MNEs, but while the international economic aspects of MNEs has been obvious, the links between thought about MNEs and general equilibrium thinking about international trade remained largely implicit. It was clear that home countries tended to have certain resource endowment characteristics, but the resource endowments of host countries evolved drastically between the 1950s and the late 1970s, causing revisions in Raymond Vernon's product cycle theory, which emphasized market structure and product-differentiating R&D and was the closest link between MNE theory and international trade theory (Vernon, 1966, 1974). Links between national factor endowments and the operations of MNEs remained largely speculative.

Recently, several efforts have been made to bring the MNE within the theoretical purview of Heckscher-Ohlin trade theory (Helpman, 1984; Markusen, 1984; Helpman and Krugman, 1985; Ethier, 1986). These models combine national resource endowments, oligopolistic market structure, informational economies through (1) R&D or administration, (2) differential international mobility of products and informational and administrative inputs, (3) product differentiation, and (4) firm integration across national borders --MNE formation -- in other words, all the elements of primary concern of international trade theory as well as those of primary concern to the industrial organization theory of MNEs. One of the major issues in the Heckscher-Ohlin work on MNEs is whether MNE formation is facilitated by greater differences in national factor endowments or by greater similarity. Intuition points in both directions. Multinational enterprises are formed by foreign direct investment, and it is plausible that investment will move capital from regions of relative abundance to areas of relative scarcity, so FDI would be more likely between countries with greater differences in factor endowments. This accords well empirically with MNEs from developed countries operating in developing countries. On the other hand, most MNE activity operates between developed countries and may be even more prevalent between countries with more similar factor endowments in the form of intraindustry trade. National specialization and subsequent cross-trade in differentiated manufactured products permits the operation of increasing returns to scale in all trading partners and is a likely pattern of production and trade among countries of relatively similar factor endowment patterns. Research in this area is still resolving these differences.

This body of ideas is relevant to the problem of United States recovery from nuclear attack for obvious reasons. If multinational enterprises may perform useful information transfer functions in a period of badly interrupted external markets, it will be equally important to know if major environmental motivations for their formation and continued operation will be disrupted by the physical damage of the attack itself. For example, if MNE formation and operation are encouraged by greater similarity in trading partners' resource endowments and those countries experience vastly different damage levels in an attack, MNE activity may taper off. The benefits that could be conferred by their informational activities may not materialize.

The Helpman model (1984; Helpman and Krugman, 1985) considers the existence of an oligopolistic industry in which firms produce differentiated products. The firms use firm-specific capital to organize production, and that capital can serve as an input at any number of dispersed locations, at home or overseas. Under conditions of sufficiently different factor endowment patterns, trade in goods will fail to equalize relative factor prices if full employment is to be maintained. However, the ability of one country, say the home country, to employ some factors in the host country, in combination with its firm-specific organizational capital, permits factor price equalization via the establishment of multinational enterprises with foreign direct investment. The firm-specificity of the organizational capital makes arms-length trade in the services of that factor inferior to an internationally integrated firm. In this model, the existence of multinationals is associated with greater rather than lesser endowment differences.

The Ethier model (1986) also is a Heckscher-Ohlin model and contains a manufacturing industry which produces differentiated products. Manufacturing has three stages in his model, research, upstream production, and downstream production. Research is integrated with upstream production. The integration of the research and upstream production firm with downstream firms in home and/or foreign countries is endogenous The research stochastically affects upstream labor productivity while factor proportions determine the wage rate. Upstream manufacturing produces a stochastic quality of product which is then sold downstream. There is an informational asymmetry problem between upstream and downstream firms that forces a choice between state-invariant and state-contingent contracts regarding how much the downstream firm will pay for the upstream firm's product. State-invariant contracts can be conducted at arm's length, but state-contingent contracts are more difficult to police and require internalization. Greater dispersion in the probability of research effects on labor productivity, relative to the wage rate, favors the state-contingent contract and internalization. As a consequence, multinationalization is implied as the home research and upstream production firm integrates with both home and foreign downstream firms. Simultaneously, greater disparity in factor endowment ratios affects the relation between the wage rates in the two countries on the one hand and the spread of the effects that research may have on labor productivity. Consequently, for any given dispersion of research

effects on labor productivity, greater disparity in factor endowment ratios between the two countries will encourage multinationalization.

In both models integration and internalization occur with multinationalization, but in the Helpr·n model, the integration is exogenous, while it is endogenous in the ·.·ier model. Both models point to the effects of factor proportions on multinationalization, but they yield opposite conclusions. The internalization that MNEs accomplish is not in question as a result of these models' different conclusions, and neither is the importance of factor proportions. The only question is the direction of influence of factor proportions

6.3.3. Policy Arbitrage

Jumping under a tariff net has been a widely cited mo··.vation for MNEs to establish manufacturing facilities in foreign countries. Prior to the enactment of the tariff, a company from country A would export and possibly maintain a distributorship in country B, but upon announcement of the tariff, would establish a production facility in country B. The MNE gets two consequent advantages: it avoids the tariff-induced reduction in country B's demand for its product if it continued to export, and it produces under the protection of country B's tariff which may leave it better off than exporting did before the tariff was put up.

The MNE similarly can avoid quotas and other trade regulations such as exchange control. Location in several countries which may have different income tax systems offers MNEs the opportunity to reduce their total tax payments by using internal financial transfers and transfer pricing policies, and shift the timing of expenditures and revenues among affiliates to disguise profits. MNEs are able to arbitrage both national financial and tax systems. Additionally, their ability to disguise profits and shift them around internally among affiliates may be advantageous when profits are affected by bargaining or regulation (Lessard, 1979).

It is not clear at all that in maximizing its overall profits rather than simply the profits of any one affiliate that the MNE confers net benefits on its home country. Incentives to arbitrage various national tax and regulation systems may be very strong in a post-attack environment, especially if a number of countries introduce controls of various sorts. The potential public benefits that might be conferred by MNEs' role as information processors and transferors might be reduced by the rents they could collect from arbitrating distortionary and/or uncoordinated national economic policies. Governments' reactions should not be to attempt closer regulation of MNEs but rather to apply economic controls very sparingly and to attempt to coordinate tax and regulatory policies which affect international business and ensure that they distort the resource allocation incentives of MNEs as little as possible.

6.4. THE MULTINATIONAL ENTERPRISE AND SECURITY OF RAW MATERIAL SUPPLY

A popular question has been whether the MNE is useful as a mechanism for assuring control of scarce natural resources in foreign countries. The answer in practice to this question over the past twenty-five years has been an emphatic no (Bergsten, Horst, and Moran, 1987, Chapter 5). The typical pattern of multinational-host government interaction in the exploitation of natural resources has begun with an initial contract consisting of low royalty payments and host country tax obligations and substantial tax and other concessions to the MNE. Mineral exploration and exploitation ventures have proved risky, and high profit rates on successful ventures, from the perspective of the MNE, simply compensate it for failures elsewhere. The host governments, however, have viewed the high profit rates differently and eventually have increased the royalty and local tax payments, restricted repatriation of profits, demanded local equity participation, sometimes as forced sales, other times as simple expropriations. Despite the MNEs' reputations for eroding national sovereignty, resource exploitation firms usually have been powerless to deal with host country governments' demands. Occasionally, pressure from the United States government has resulted in some compensation for expropriated property, but not always, despite the Hickenlooper and Gonzalez amendments which require the suspension of unilateral aid and other financial support from the United States to any country that expropriates private U.S. property without fair compensation.

Methods of assuring raw material supplies other than vague or explicit reliance on MNEs should be found. Stockpiles are an obvious method with known costs and benefits, but they do not involve MNEs. An alternative policy suggested by Bergsten, Horst, and Moran (1978, pp 159-163) does involve MNEs, but not as equity investors in host countries. Bergsten et al. recommend that MNEs offer service contracts to host governments to operate host government-owned resource exploitation facilities. The host governments cannot expropriate what they already own. On the other hand, the governments, particularly developing country governments, probably would borrow to develop the facilities, but Bergsten et al. suggest that the governments would be more loath to default on international debts and jeopardize future international credit ratings than to expropriate. The events of 1982 and subsequent years may have dispelled this belief. At any rate, encouraging the use of American MNEs as service contractors in foreign resource extraction industries rather than as equity participants may be the best the U.S. government can do in using MNEs to protect--not ensure--raw material supplies. Service contracting would be a more effective policy the lower is the substitutability in operating the facility between expatriate MNE personnel and host country personnel.

6.5. AMERICAN AND FOREIGN MULTINATIONALS

So far the discussion has focused implicitly on American multinationals. In the first thirty years of the post-World War II

period, most FDI involving the United States was outward bound American investment, but by the mid-1970s, foreign, primarily European, multinationals were beginning to invest in noticeable volumes in the United States, with Japanese investment beginning slightly later. In 1970, the total stock of foreign multinationals' direct investments in the United States was 17% of the total stock of American FDI abroad. In 1979, that stock percentage was 27%, and by 1982 it was 45%, with the inward flows correspondingly much higher (Pugel, 1985, p. 59). Popular presses have cried various forms of danger regarding foreign ownership, and there is the very real question of the foreign repatriation of profits, including extracted rents, from the United States. Presently, these are probably not of first-order importance in magnitude, and concentration on them may obscure opportunities foreign MNEs operating in the United States may offer in U.S. recovery from a nuclear attack.

The foreign MNEs operating in the United States represent the economies of America's leading trade partners and the strongest economies in the world outside the United States itself. In the post-disaster period, their multinationals' presence in the United States would give the United States direct access to capital from those countries which incurred less damage than the United States. While foreign MNEs in the United States presumably would experience physical damage typical of U.S. owned facilities in the U.S., the foreign MNEs would have access to the infrastructure of their parent firms in countries which may be damaged less extensively. They may be able to better withstand and more readily recover from local disruption than can strictly domestic businesses.

Thus, while foreign MNEs may raise some legitimate concerns about the national welfare effects of the disposition of rents earned from business operations in the United States, the extensive presence of foreign equity holdings in business operations in the United States may offer prospects of additional stability during efforts to recover from a nuclear attack. Under such circumstances, any efforts by the United States to impose restrictions on repatriations of profits in order to rebuild the United States capital stock might be redundant as well as counterproductive.[33]

6.6. POLICIES TOWARD THE MULTINATIONAL ENTERPRISE DURING RECOVERY

The multinational enterprise may be able to offer two major aids to recovery from a nuclear attack. Price signals, both domestic and international, can be expected to be erratic and distorted in ways unknown to observers by the destruction of transportation and communication facilities. The internalization of markets by MNEs has

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[33]The Western European nations imposed capital export restrictions during their recovery from World War II, and those policies have been cited as contributing to their recovery. However, it is entirely possible that those policies contributed little or even retarded recoveries led by other events.

given them administrative channels for producing and transmitting price and nonprice information. While MNEs can be expected to suffer physical destruction like the rest of the economy, the knowledge of these administrative systems is less likely to be destroyed and the systems will be more easily repairable than will be transportation and communication infrastructure. In the event of continuing exchanges, these administrative systems may be less vulnerable to interruption than are external markets that depend on easily damaged physical infrastructure.

Two possibilities exist for the use of MNEs internal information systems. One is to uninvasively observe MNEs' external pricing decisions and disseminate that information in the domestic economy, letting private decision makers use the information as they see fit. By uninvasively, we mean that no regulations would be enacted to permit the government to enter MNEs' proprietary domains to collect price or other information. The other possibility is to invasively collect price and other relevant information from MNEs records and to publish the information. The invasive procedure may appear appealing, but it may generate systematically distorted information. In the first place, MNEs may deliberately keep separate accounts, as many are alleged to do presently regarding transfer pricing and profit shifting, so that the government simply would get incorrect information. Alternatively, the government may be able to enforce honest record-keeping, but the effort could distort the resource allocation incentives of the MNEs, leaving the United States economy worse off than without the information. This is an empirical question, however, and the welfare gain from the information could conceivably outweigh the welfare losses of distortions. Furthermore, the possibility cannot be dismissed that MNEs could find it in their own interests to publish information from their internal records and that cooperation with government attempts to obtain information for the rest of the economy might be forthcoming. A further scenario would entail paying MNEs for internal information, although a moral hazard problem exists with that option: the price might induce the MNE to collect more information than it can obtain with accuracy, although current consumers of market information firms face the same problem, and the market itself may solve the problem.

Both the presence of American MNEs in less damaged trading partners and the presence of foreign MNEs in the United States may offer the United States access to additional capital for recovery as well as price information. Foreign MNE presence in the United States should be encouraged, even if some restrictions on profit repatriation are considered. Continued FDI abroad by American multinationals would be an issue of contention domestically, however, probably even more than it has been to date, with the destruction of American capital stock in a nuclear attack. If unions continue to be an organized force in a post-attack situation, their objections to MNEs' "exporting employment" may gain political, if not necessarily economic, force. Again, this issue is an empirical one, and the consequences of severe curtailment of foreign investment by American MNEs should be assessed carefully. Additionally,

the distortionary effects of unequal treatment of capital exports by foreign and American multinationals should be investigated.

7. THE INTERNATIONAL ECONOMY AND U.S. RECOVERY FROM NUCLEAR CONFLICT: ALTERNATIVE CONFLICT PATTERNS AND POLICY OPTIONS

7.1. INTRODUCTION

To this point, the report has dealt with topical issues separately and, except for the case of real trade, without explicit reference to specific patterns of conflict and destruction. In this chapter, we explore the simultaneous interactions among the topics of the various chapters: short-term financial crises; interrupted real trade flows; uncertain demand, supply, and price information; the role of the multinational enterprise; and macroeconomic stability. To do this we posit some alternative patterns of conflict involving nuclear attacks, because the nature and extent of a nuclear conflict would affect international conditions both quantitatively and qualitatively.

We investigate four scenarios, using three alternative conflict patterns. The first scenario is one involving a protracted land war in Europe (and possibly other areas) and including tactical nuclear strikes in Europe, limited counterforce strikes against American missile installations, and limited countervalue strikes against critical production facilities. The second scenario, associated with the first, is a period of peacetime recovery from such a war. These first two scenarios help distinguish between problems associated with continuing hostilities and those that do not depend on the continuation of conflict. The third scenario hypothesizes hostilities opening with an exchange of strategic nuclear strikes. In contrast to the first scenario, this scenario allows us to consider the consequences of the amount of preparation time available to the government to deal with specific economic events such as a financial crisis. The fourth scenario is a much more devastating attack against population centers, with more extensive fatalities and physical destruction.

The scenarios were developed to provide a basis of discussion of the types of economic problems resulting from international linkages in the event of a nuclear conflict. They are not intended to conjecture on preferred or optimal strategic targeting options.

7.2. INTERNATIONAL PROBLEMS DURING A PROTRACTED CONFLICT OF LOW TO MODERATE NUCLEAR INTENSITY

We define the pattern of conflict, then examine international economic issues that would arise in such circumstances. Many domestic economic problems will arise, some of which have international ramifications, all of which are very important for planning purposes. At the risk of some arbitrariness, we concentrate our attention on the "more international" of the problems. Other studies have addressed domestic economic issues associated with nuclear conflict in far more detail than

we could here, and it is the international economic ramifications that are the subject of the present report.

Suppose a conventional land war broke out in central Europe, involving the NATO allies on one side and the Warsaw Pact countries on the other. At some point--say six months to a year into the war--the two sides resort to the use of tactical nuclear weapons to disrupt military targets in each other's rear battle areas: rail heads, supply depots, ports on the North Sea, and, occasionally, troop concentrations. In this series of exchanges, the U.S. soil is not directly affected by nuclear weapons, although it may experience fallout problems. Several months later, strategic nuclear weapons are used by both sides, but strikes are limited to missile launch sites in the United States and the Soviet Union. Six weeks after that exchange, some pinpoint countervalue strikes are made against production facilities in both the United States and the Soviet Union. These are accompanied by similar, pinpoint countervalue strikes against production facilities in Western and Eastern Europe. Since the United States has a military presence in Japan, we assume that, during the strategic nuclear strike phase of the war, Japan enters the war on the NATO side.

We point to several economically important characteristics of this scenario. First, there is considerable lead time between the outset of hostilities and the first nuclear strikes. Second, there is even greater lead time before the first strategic nuclear strikes. Third, we suppose that the Pacific rim countries, with the exception of South Korea, are uninvolved. Fourth, there is no wanton destruction of political/administrative control cities such as Washington, Paris, London, or Moscow.

What international economic problems would arise? First, it is likely that the tensions preceding the opening of conventional hostilities would precipitate a flight of European capital to both the United States and Japan, driving up the values of the dollar and the yen relative to the major European currencies.[34] This would be halted after some short period by European-imposed capital controls which would also result in restricting payments for previously traded goods and services. The IMF would get involved quickly in lending to European governments pressed by reserve losses, and the United States and Japan might lend or swap currencies with the European central banks to help maintain the values of their currencies. International banks in the United States might face severe liquidity problems as payments on overseas loans cannot be met, and links with the domestic commercial banking industry would also pose problems. The tendency for the dollar and yen to rise in value would jeopardize American and Japanese exports to depreciating-currency countries and would increase the value of European debts owed to Americans and Japanese denominated in dollars or yen. There probably

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[34]We do not dismiss the possibility that the price of gold and/or silver will be bid up also. We simply state that capital will flow to countries not initially involved in the hostilities.

would be a reluctance on the part of importers outside Europe to take advantage of the depressed European currencies and place import orders in anticipation of hostilities. If the appreciation of the dollar and the yen were allowed to continue for long, there could be domestic macroeconomic demand effects in both countries unless the two countries could find other outlets for their exports. Nevertheless, the reduction in European demand for commodities on world markets could not be avoided by everyone.

However, the pre-hostilities problems of international capital controls and currency revaluations leading to trade and employment reductions would give way before long to the problems associated with the opening of conventional hostilities. We suppose that the United States is a combatant but that Japan is not. Submarine warfare could menace ocean shipping to the United States on both the Atlantic and Pacific coasts. The Gulf coast might be less threatened, but there would be less traffic from that region even though oil shipments from both Venezuela and Mexico would be important. The European civilian economies and NATO forces in Europe might have problems receiving energy shipments. Ocean shipping rates and insurance rates would skyrocket and would have effects very similar to high import tariffs imposed in all countries, but without the attendant political ill will and commercial retaliation. Air transportation would be able to substitute for interrupted ocean shipping only to a very limited extent and probably would be subject to interdiction itself.

This grim assessment for ocean transportation may be overstated; it is clearly dependent on the effectiveness of antisubmarine measures and the availability of convoy protection. Military escorted convoy transportation could reduce ocean shipping costs during conventional phases of combat, but, like troop concentrations, convoys might be especially vulnerable to air bursts from nuclear weapons. As noted in an earlier chapter, United States trade with Latin America might increase, although time would be needed to orient Latin American production to the American market. American trade with Canada would increase as well, but the short-run limits on Canadian production possibilities might make that more of a long-run prospect, and even then, Canada has a small economy and could not begin to replace the production possibilities of Western Europe and the Pacific rim.

The prospects for real trade in a protracted war with potential nuclear involvement against shipping are not good, but the economic consequences of the trade reduction--at least for the United States--should be less severe than might be supposed. The United States is a very large and diverse country and better replicates the entire world economy in its diversity than any other country. In a protracted war, with near total interruption of trade but before nuclear action against its own territory, the United States could substitute for commodity shortfalls better than most countries. Its trading partners, on the other hand, might be hurt worse by the loss of their markets in the United States and Western Europe. Employment in the United States should not suffer because of wartime demand increases, but uninvolved countries

would not have that compensatory benefit. We assume that the United States would not substitute Warsaw Pact trade for NATO trade, through naval blockade if not by other means; most of the noncombatant Pacific rim countries would use ocean shipping to trade with the Soviet Union, although some shipments through the Peoples Republic of China are conceivable.

The food-importing countries of the world, particularly the poorer ones, would face the loss of American and Canadian grain exports if the viability of ocean shipping were in jeopardy. Some arrangements might be made for third-country shipping to carry such cargoes, but a Soviet blockade of North American ports might prevent such a possibility.

The European NATO countries still would be able to trade among themselves, but trade between them and overseas countries, including the United States, would be substantially reduced. However, with the worldwide interpenetration of capital stock ownership by foreign nationals, capital markets would remain linked, and repatriation of profits (if permitted by host governments) could be conducted electronically. At the same time, with reduced real goods shipments, there would be what are known as "transfer problems" with repatriating profits. That is, if the profits made in Europe by an American multinational can be wired back to the United States, but goods cannot flow from Europe to the United States for those repatriated profits to buy, all the money can do in the United States is compete for domestically produced goods and services. Unless there was above normal unemployment in the United States, the repatriated profits would fuel inflation by augmenting the domestic money supply. This suggests that the linkage between national capital markets when real trade is substantially reduced would be looser than during normal times, and interest rates would not follow one another as closely. Consequently, maintenance of interest parity conditions in the international capital market would be unable to arbitrage exchange rates. The final implication of this is that domestic economic policies could be conducted with fewer economic leakages and interruptions from abroad. This conclusion is based, however, on the assumption that hostilities vastly reduce real trade, except for military movements, so that the United States and its NATO allies (and South Korea) would be largely autarkic.

Strategic nuclear escalation of the conflict would not significantly change the international economic consequences of the tactical nuclear exchanges if ocean shipping were largely interdicted or interdictable. The effects of nuclear winter might leave much of the Third World and some of neutral Asia without much food. However, without shipping to get American stockpiles out, that may be a moot issue unless both sides in the conflict agree that the humanitarian issues warrant a loosening of the blockade.

The major conclusion to come from this scenario is that the percent reduction in real trade that is induced by hostilities in a protracted conflict, whether conventional or nuclear, is important. If the United States and its allies become isolated by oceans, most of the important

international linkages in the United States economy will be severed, and the United States will enter a situation of near autarky. As noted above, however, nonoceanic trade with Canada and Mexico and some gulf shipping with Latin America are exceptions. Capital market linkages would become less important. The advantage of assuming the near total interdiction of ocean shipping to and from the NATO allies and the Warsaw Pact nations in this scenario is not in the cogency of the assumption--it may be vastly overstated in that a good deal of pre-war transportation may be sustainable even in wartime--but in its highlighting of the importance of real trade links for the effectiveness of retaining international economic links.

However, in the longer term, the linkages between the international economy and the domestic U.S. economy would be important. The war will end and the noncombatant parts of the world may have suffered considerable economic damage by being cut off from their former trading partners among the NATO allies. In fact, a moderate nuclear winter effect on agricultural production of major food exporters among noncombatants, combined with seriously reduced or nonexistent food trade from the United States and Canada, could precipitate a catastrophic famine in Africa, as well as parts of Asia. Food scarcities could precipitate wars among some countries having no involvement in the European war, leaving the economies of these countries even more tenuous. The United States could find the rest of the world nearly as damaged economically as it was itself and in little condition to facilitate American recovery.

If ocean shipping were not as thoroughly interdicted as the scenario has so far assumed, not only would real trade be much more important, but the international capital and money markets would play more active roles in U.S. economic activity. If European trading partners continued the capital controls imposed to halt capital flight at the beginning of tensions, the United States should encourage them to relax the controls, using international organizations such as the International Monetary Fund as the conduit. It would also be more important in such circumstances to ensure that trade would not directly or indirectly support the enemy's ability to conduct war. Indirect trade with enemies was conducted during both World War I and World War II, so there is no reason to suppose that U.S. firms would automatically shun potentially lucrative markets just because their buyers happened to be engaged in a war with the United States.[35] The problem is even more acute with the existence of worldwide affiliate networks of multinational firms, particularly when some

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[35]Ferro (1973, pp 130-32) documents the trade between British and German firms, via Sweden and Denmark and via Holland and between German and French firms via Switzerland during World War I. The German firms got a better price for artillery shells from the French than they did from the German War Ministry and went with the better price. Meanwhile, British firms were selling motor and brake oil, airplane fuel, nickel for guns, tropical seeds required for the manufacture of glycerine, and concrete for blockhouses to the Germans.

affiliates may have some host government equity in neutral or Warsaw Pact-leaning countries.

It is likely that ocean shipping rates will be higher than in peacetime because of increased military demands on shipping as well as greater risk of destruction in hostile action. This would shift supply curves of imports to the left, and American exporters would face reduced demand in their overseas markets for similar reasons. The higher transport costs effectively act as import tariffs. The removal--or at least reduction--of existing tariffs would counteract, at least to some extent, the increased shipping rates and still leave domestic producers with equivalent protection. Multilateral negotiations for tariff reductions should be conducted quickly, at least among the NATO allies and Japan.

The continuation of real trade would subject the conduct of domestic monetary and fiscal policy to external influences. Attempts to fix exchange rates with major trading partners would be a mistake. However, the European capital markets, in particular, are likely to be volatile since the ground war would be conducted largely in their countries or nearby, and the United States might want to insulate its domestic economy from frequent, erratic shocks attributable to European reactions to "news from the front." On the other hand, the United States would be unable to insulate itself from European capital and money market shocks emanating from more fundamental events in Europe, such as the loss of territory or production facilities. A domestic policy of routine sterilization of exchange rate or interest rate changes could be troublesome if the more fundamental shocks are difficult to distinguish from the ephemeral ones. We can offer no easy policy prescriptions regarding this problem, but dealing with it would require flexibility rather than rules. One problem that is predictable is systematic depreciation of the European trading partners' currencies during the phases of war before strategic nuclear strikes if they suffer major losses of territories, populations, and/or production facilities, and do not contract their money supplies accordingly.

7.3. RECOVERY FROM THE PROTRACTED WAR

Many of the international linkages that were cut off or reduced as the result of the presumed cessation of civilian trade during wartime would be reopened after the end of hostilities. An important question involves postwar sovereignty, however: how many of the European countries not in the Warsaw Pact before the war would retain their political sovereignty? That question could be posed for Korea and Japan and the neutral Pacific rim countries as well. The question is sensitive, but it is very important from an economic standpoint. If some or all of these formerly important trading partners of the United States are no longer sovereign, they may be unavailable as trading partners. We assume initially that postwar sovereignty is identical to prewar sovereignty.

The war as we have described it has lasted some two to two and a half years. Suppose that the strategic nuclear strikes reduced the populations of the combatant nations by an average of twenty percent in each nation. The extent of famine-related deaths in Africa and Asia is an important question that we dismiss for the moment. Several large cities in each group of combatants would have experienced extensive damage, but the political centers are assumed to be unaffected by direct nuclear strikes. Production in the United States has been rearranged to substitute for former imports, more in war-related products than in civilian consumer goods. The domestic American and international financial systems are assumed to have withstood the crises at the beginning of the hostilities, although the international capital market has not been particularly active and interest rates have drifted away from parity internationally. Capital controls and the relative absence of trade have allowed combinations of national price levels and exchange rates (which may be little more than nominal quotations) to drift away from equilibrium. Domestic monetary management during wartime may have attempted to maintain what is believed to be equilibrium in these variables, but the absence of much trade and capital flow and price information would make the results of the effort suspect.

If shipping was damaged extensively during the war, transportation rates will be high initially and would only come down to the extent that undamaged shipyards can expand the freighter stock. When the c.i.f. prices (cost, insurance and freight costs included in the price) of imports begin to come down with reductions in transportation costs, pressure to protect wartime import substituting producers with tariffs, quotas, and other devices may arise. It should not be assumed immediately that prewar trade patterns will be economically viable postwar trade patterns, however, and some time would be required for new patterns of relative competitiveness to reveal themselves. In the meantime, it would be important to coordinate commercial policies internationally to avoid a tariff war. The reopening of trade would facilitate physical rebuilding of war-damaged countries, particularly if c.i.f. prices fall and go unreplaced by tariffs or other barriers.

The reopening of trade would require equilibration of exchange rates, and that might involve sensitive issues. Government support of any given exchange rate might foster inflation or unemployment as well as hinder trade and possibly foster trade wars unless cooperative agreement could thwart that possibility. Simultaneous maintenance of wartime capital controls would prohibit the capital market from helping much in determining new equilibrium exchange rates. Thus, while reestablishing trade would be beneficial, there could be a number of constraints such as quotas, rationing schemes, and the like that would lessen the benefits received from the increased trade. These constraints should be lifted quickly to permit markets to generate price information and resources to flow to higher-return activities. There will always be special cases of market imperfections and market failures, particularly in the confusion and destruction following a strategic nuclear exchange of any but the most limited type, but these failures should be distinguished from government-induced market paralyses. Occasionally, corrective taxes or

other interpositions should be taken to reduce such externality problems, but the actions should be as direct as possible, and generally should not involve trade restrictions or generalized market controls.

If trading partners have left the capital controls imposed in wartime in place, the United States would have to decide what degree of freedom of capital movement from its own borders would be optimal. Without further information on international conditions, a recommendation of no capital controls in the face of trading partners' capital controls cannot be made. Some intervention might be preferable from the point of view of the United States, if not necessarily of the world as a whole, to no interventions. If trading partners leave capital controls in place, direct foreign investment by multinationals might circumvent direct controls to some extent, as well as reestablish or strengthen a eurodollar market.

Reestablishing a eurodollar market would also strengthen the position of the dollar as an international vehicle currency, and the damage pattern of this scenario implies that the dollar would not be weakened relative to other major, prewar international currencies. A possible exception to this statement is that the yen might benefit if Japan was not subjected to direct nuclear attacks during the strategic exchange phase.

Increased trade, or particularly aid, in food stocks associated with a nuclear winter could introduce one problem while it ameliorates an immediate one. High food prices would be an inducement for farmers in affected areas, and if American food stocks were still being shipped to such countries early in the first season in which weather permitted planting, the shipments could depress prices and retard cropping even though weather conditions permitted. U. S. PL 480 food shipments have been known to reduce incentives to farmers in the recipient countries. In a period when weather conditions did not permit planting anyway, food shipments clearly would not have any such effect, but if food stocks lasted long enough, or new harvests from unaffected regions entered food-short country markets at subsidized prices when climate conditions were favorable, they could have detrimental effects. Our point is not a blanket recommendation against trade or aid in food stocks to starving countries, but that care must be taken during a recovery period to ensure that humanitarian efforts do not retard recovery efforts.

7.4. A CONFLICT THAT OPENS WITH A STRATEGIC NUCLEAR EXCHANGE

This scenario explores the international economic ramifications associated with a conflict that erupts immediately as a nuclear exchange. We suppose that such an exchange begins with counterforce strikes against missile silos rather than as a countervalue strike or a simple strike at populations. Simultaneous nuclear strikes are made at American and NATO missile installations overseas. We assume that these strikes are not followed up by countervalue or population strikes.

There would be immediate effects in both domestic and international financial markets. Capital would leave Western Europe, the United States, and Japan, but it is not clear what type of investments would be made. Gold is an obvious candidate asset, but publicly held, nonmonetary gold stocks might be very vulnerable to countervalue and population strikes which are anticipated by asset holders. Switzerland is vulnerable to both direct attack and secondary physical and economic damage. Singapore dollars or Singapore central city land could sustain only a small fraction of the capital outflow. The same is true of Buenos Aires and Rio de Janeiro, and they also have reputations for unstable currencies. Australia and New Zealand might be involved in the conflict and, therefore, may not be major destinations. A plausible conclusion is that capital flight would be minimal for want of any reasonable, safe haven.

The destruction of private physical assets might be less severe in the United States than in Europe and Japan because of the relatively remote locations of missile emplacements in the United States and the unavailability of such remote locations in the latter countries. The marketability of American stocks might be less impaired by uncertainty regarding destruction than European and Japanese stocks. However, it is likely that both American and overseas stock exchanges would shut down for some time to avoid panic selling. This shutdown would quickly affect investment banks and international commercial banks, particularly with the recent developments in the nonbank financial supermarket industry in which not all banks are called banks and regulated as such. Some moratorium on interbank debt repayments should be coordinated internationally with IMF participation to prevent liquidity crises from causing widespread business failures. Any domestic debt moratoria, particularly those involving suspension of repayments to overseas creditors, should be coordinated with the international moratorium. This presumes that the domestic monetary and banking system remains intact; that is, preserved by a combination of timely suspensions, deposit guarantees, last resort lending, and possible currency redenomination. Destruction of physical assets and deaths of owners would, of course complicate the restitution of claims. Although the international economy and its institutions clearly are linked with the domestic economy and its institutions at points like the financial system, further consideration of these domestic issues is outside the scope of the present study.

Foreign exchange rates would experience some volatile movements until sales were suspended temporarily by governments. However, because there would be no obvious safe havens, there is no clear presumption, a priori, of which currencies would appreciate against which others. The progress of exchange rates would depend on the pattern of any continuing conflict, nuclear and/or conventional. If the conflict were called to a quick halt after the initial exchange, exchange rates should be allowed to seek their new equilibrium levels. This should be accomplished through international coordination with the IMF. Countries might desire to control the rate of approach to new equilibria through a phased-out defense of particular rates over a six-month period, for example. One problem with such an announced plan could be that market information on

the equilibrium rates could precede the phased transition, and expectations of a phase-out could impede out-of-equilibrium sales and trade. Early transactions that were restrained from reaching equilibrium prices might nonetheless produce valuable information on the degree of disequilibria.

If the conflict continued at a conventional and possibly tactical nuclear scale in Europe, there would be continuing problems of exchange rate fluctuations, and the situation would be similar to that described above in the case of the gradually escalated conflict without complete trade interdiction. As real resources were destroyed in various countries, exchange rates would change, but movement would be characterized by mixed flutters of various magnitudes and amplitudes in reaction to short-term war news. A major problem facing both governments and producers in the export-import market for foreign exchange would be distinguishing "noise" from resource allocation messages in exchange rate movements. This, of course, assumes that trade is not completely interdicted.

If, on the other hand, the conflict were to escalate to countervalue strikes, demands for some imports would increase, would decrease for others, and the exchange rates used in the trades would be even more volatile. Forward covering of exchange purchases would be less likely to offer protection from exchange risk because of large uncertainty about future rates. An alternative exchange mechanism might be barter, coordinated through governments and/or multinational firms. International barter was resorted to in Europe during the exchange control and trade war period of the early and middle 1930s and was not highly successful (Friedman, 1974, pp 30-31; Ellis, 1941, pp 14-15, 45, 118-19, 130-31). At any rate it is unlikely that the government, under these circumstances, would have resources to devote to identifying suppliers and demanders of highly specific goods, and we do not recommend that it attempt to do so.

The time of year of the conflict will be a major determinant of any nuclear winter effect as well as the requirement for any trade or aid in food stocks to regions with major crop failures. The issues in such trade would be the same as those described above in the recovery scenario.

7.5. A CATASTROPHIC INITIAL EXCHANGE

The last scenario we consider is a catastrophic, initial strike against both population centers and military installations. We assume that all cities of one million or more people in the NATO and Warsaw Pact nations are attacked, including the political centers such as Washington, Paris, and Moscow. The majority of governmental functions would be destroyed, including most of the machinery of economic administration and regulation. International economic institutions, such as the International Monetary Fund and the Bank for International Settlements, would be destroyed. Ports, as well as equipment for their repair, would

be damaged beyond use. Depending on the time of year, we assume that the nuclear winter effects could cause worldwide crop failures for two years.

In such catastrophic circumstances, the ability to trade internationally would facilitate recovery, but it is doubtful whether governmental machinery would be available to either assist through maintenance of financial structures or to hinder through unwise restrictive regulation. Confusion about surviving populations, stocks of goods, and productive resources would dominate. Modern communications systems probably would not operate on large scales or reliably over long distances because of damage to equipment and unavailability of repair capabilities. Affiliates of multinational corporations might stand the best chance of ascertaining conditions, particularly overseas, but it is not clear whether their products would be involved. Multinationals tend to be heavily represented in R&D-intensive industries involving more sophisticated products, and it is not clear that the demand for technologically sophisticated products would be especially high in the immediate aftermath of the disaster (with the exception, possibly, of medical supplies, and even then demands might be shifted toward simpler products).

To the extent that national governments' administrative machinery still existed in fragmentary fashion, they might find it useful to make pacts with multinational enterprises to assist in reestablishing international communications and international economic institutions such as a monetary system. If elements of international economic institutions such as the IMF survive, they should be included in such reconstruction efforts.

While it would be vastly more difficult in comparison with the other scenarios discussed above, trade and/or aid in food would be of first-order importance. Port and shipping destruction would be a major retarding factor in conducting such trade, as well as locating surviving populations in need of food supplies. With severe damage to communications, particularly international communications, locating populations (particularly Third World groups whose communications facilities are more fragile even in normal conditions) would be difficult. Additionally, surviving groups with food stocks might not have sufficient resources to locate food deficient survivors.

If what is generally considered to be the modern infrastructure of the world is largely destroyed, either through direct strikes or through secondary damage, it is noteworthy that international trade and fairly sophisticated monetary payments systems have operated robustly in periods without electronic or even electrical technology. Initial problems, as mentioned above, would be locating centers of demand and supply. Sophisticated credit and payments arrangements do not depend on electronic technology, and even currency could be privately supplied by surviving mercantile or integrated manufacturing and mercantile firms, most likely multinationals. Such privately-issued monies might circulate beside official, government currencies. Although private currency currently is illegal in the United States, and in most other countries,

the government might want to initially foster its use to economize on its own administrative and supervisory resources and to establish another, independent source of price information. As the government regained strength, it could reassert monopoly power over money issue.

An important point in recovery from such a catastrophic attack is that the government should accept as much assistance for institutional reconstruction from private sources as it can get. In a desperately resource-scarce world, the utmost benefits would come from following comparative advantage. If private organizations can more efficiently provide some infrastructural services in the international economy that were formerly provided by government, they should be encouraged to do so and government should use its own resources to perform other urgently needed functions.

8. CONCLUSIONS

Much of what can be said about the international economy in recovery from a nuclear war is highly dependent upon specific assumptions about conflict patterns and government reactions. However, we distill some lessons, occasionally recommendations, that are generally applicable before a conflict and some others that would apply to more specific situations as events unfold in an actual conflict.

The first economic consideration in the event of a conflict, either conventional or nuclear, is stability of the international financial system. This is, of course, intimately connected to stability of domestic financial systems. Strains on these systems actually could arise prior to the outbreak of hostilities. Combinations of policies such as deposit insurance, temporary deposit suspension, financial market and banking holidays, and temporary debt moratoria, coordinated internationally through an agency such as the International Monetary Fund, could sustain the international and domestic financial systems. International coordination of suspensions and debt moratoria are essential for international stability.

Short of a catastrophic nuclear exchange against populations which destroyed most of the major cities of the western world, there does not appear to be a scenario which would result in the evaporation of the international role of the U.S. dollar. Its present centrality in the international reserve currency system might be nudged a bit by some other currently competing currencies, but the dollar certainly would not cease to exist as an international currency.

The extent of real trade flows among NATO allies and their trading partners during a conflict is of utmost importance. This may appear obvious, but a number of other factors are dependent on this trade. If interdictions--or the threat of interdictions--reduced ocean shipping (and transoceanic air transport) to a nominal level during a conflict, the international financial market would become relatively unimportant to the U.S. economy. However, this is not the case for the United States' European allies who still might be able to engage in land trade. If real goods cannot move, there is little that capital flows can accomplish other than to affect national money supplies and redistribute income within the affected domestic economies. This applies whether the conflict is nuclear or conventional. Additionally, if trade is interdicted, food trade to offset nuclear winter effects among food-importing countries could become a moot issue unless an agreement among combatants could be reached regarding such food shipments.

The total or near total cessation of ocean shipping during a conflict would be more harmful to most of the United States' trading partners than to the United States itself. The United States is large and sufficiently endowed enough to offer nearly as great a portfolio diversification of economic activity as the world at large.

Substitutions in production and consumption could keep the economy going, with some critical materials being made available from stockpiles, even with the loss of some production capacity as a result of strategic nuclear strikes. This does not imply that the United States would be unharmed or would not have its national welfare seriously reduced; however, it could withstand the severing of trade linkages better than just about any other country in the noncommunist world, simply because of its size and diversity. America's trading partners, however, would suffer economically from losing American markets, even if they are not directly damaged by nuclear strikes. In the United States, the depressing income effects of losing export markets would be at least partially compensated by increased wartime military demands.

The conclusion regarding trade and capital market interconnections must be tempered somewhat. Given the current distribution of foreign ownership of productive assets (direct investment), as well as portfolio investment, a nuclear strike against any one country would have direct effects in the capital markets of a number of other countries as their physical assets are destroyed or endangered. Even with no trade flows, the destruction of overseas assets owned by American multinationals would depress those companies' stock prices and induce portfolio rearrangements in the United States. Indirectly, if American-owned portfolio investments overseas (foreign corporate bond holdings, for example) were harmed or jeopardized by hostilities, the U.S. capital market could be affected even with no capital flight. Price depressions would reduce wealth of American holders and alter their demands for asset holdings in the American capital market independently of the direct effects on their demands to hold assets in affected foreign capital markets.

Of particular importance to the United States, both militarily and commercially, is the possibility of interruption of the Middle East oil trade with Western Europe and Japan. A cutoff of oil supplies to those regions would largely eliminate NATO mobility. Additionally, such a cutoff would seriously reduce civilian mobility and hurt the economies of those countries. Substitutions toward coal could be made for some ship transport, but the switch to coal for trains would be more difficult. Truck traffic would decline precipitously. Energy use in factories and buildings would be affected less because of the substitutability of coal and natural gas, although peacetime reliance on Soviet natural gas would introduce a vulnerability. A severe energy crunch in Western Europe and Japan would have a depressing effect on those countries' aggregate outputs and incomes which could translate into a similar effect on the American economy. Ways can be found to substitute around cutoffs of critical materials, but would be easier in the case of rare metals which are used by the kilo or the hundredweight, and in quite restricted products or processes, than it would be to substitute away from a material like oil that is used in millions of tons in many activities. It is true that civilian travel restrictions could reduce oil consumption by as much as twenty-five to thirty-five percent, but that leaves sixty-five to seventy-five percent of present usage to do something about (see IEA, 1984, pp. 14, 27, 40, 53).

In a nuclear conflict which resulted in heavy damage so that supply, demand, and price information were difficult to transmit internationally, or possibly even domestically, multinational enterprises might be able to serve as information generation and transfer agents. In the most dire set of circumstances, they also might be instrumental in reconstructing monetary and credit systems that could operate internationally. In less devastating conflicts, particularly in postwar recovery phases, multinationals could be important in the international transfer of capital and trade in products. On the other hand, however, there is the possibility of multinationals trading with hostile nations which would be difficult to contain. Trading with the enemy in critical materials was popular and profitable with private firms in both World War I and World War II, and the circumstances of the present multinational firm suggests that such trade would be even more difficult to control now. Foreign affiliates of U.S. multinationals operate in many neutral or nonaligned countries, beyond the effective reach of U.S. law. In a number of countries, host governments hold equity interests in the affiliates. Consequently, if the desire for present value maximization on the part of the multinational could be held in check by law or appeal to community responsibility, host government policy toward sales to Warsaw Pact countries could prove even more difficult to contain than the profit motive of the firm itself.

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INTERNATIONAL CONSIDERATIONS ASSOCIATED WITH ECONOMIC PLANNING FOR RECOVERY FROM A GENERALIZED DISASTER

Unclassified
June 1986
128 pages

by Donald W. Jones and Lawrence J. Hill
Oak Ridge National Laboratory, Oak Ridge, TN 37831

Interagency Agreement: FEMA No. EMW-84-E-1737;
DOE No. 1457-1457-A1

This report addresses international economic considerations in planning for recovery from a generalized disaster, including the geographical dispersion of economic activity and the importance of the U.S. dollar in international trade. The discussion includes real trade issues and international monetary or financial considerations, emphasizing the relationship between the two. Included in the discussion of international monetary considerations are the causes, consequences, and resolution of six historical financial crises which are used as analogues for planning for restoration of the international monetary system. Additionally, the foundation of the multinational enterprise and its possible roles in recovery are addressed.

Although the report addresses several specific disaster scenarios and appropriate policy responses in reaction to them, a number of important general policy guidelines were discussed. First, international cooperation and coordination are of paramount importance in restoring the effective functioning of the international monetary system. Second, a policy of fixed exchange rates in the aftermath of an international disaster is ill-advised. Third, except for commodities crucial to national defense, domestic import and export controls cannot be justified. Fourth, the extent of real trade reduction during a conflict has widespread financial—as well as real—repercussions. The United States probably could withstand real trade disruptions during a conflict more successfully than many of its current trading partners. Finally, multinational enterprises might be important institutions in recovery from both real and monetary standpoints, acting as the international conduit for capital flows, trade flows, and, in more serious disasters, price signals and international monetary and financial reconstruction.

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